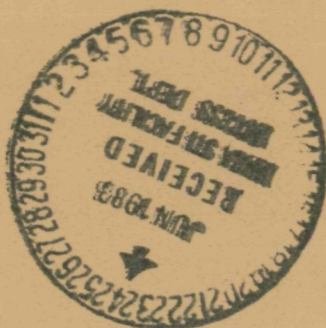


Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011(246)
June 1983



(NASA-SP-7011(246)) AEROSPACE MEDICINE AND
BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH
INDEXES (SUPPLEMENT 246) (National
Aeronautics and Space Administration) 70 p
HC \$7.00

N83-27579

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CSCL 06E 00/52 12259

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 246)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in May 1983 in

- *Scientific and Technical Aerospace Reports (STAR)*
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This supplement is available as NTISUB/123/093 from the National Technical Information Service (NTIS), Springfield, Virginia 22161 at the price of \$7.00 domestic; \$14.00 foreign.

INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 219 reports, articles and other documents announced during May 1983 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Six indexes -- subject, personal author, corporate source, contract, report number, and accession number -- are included.

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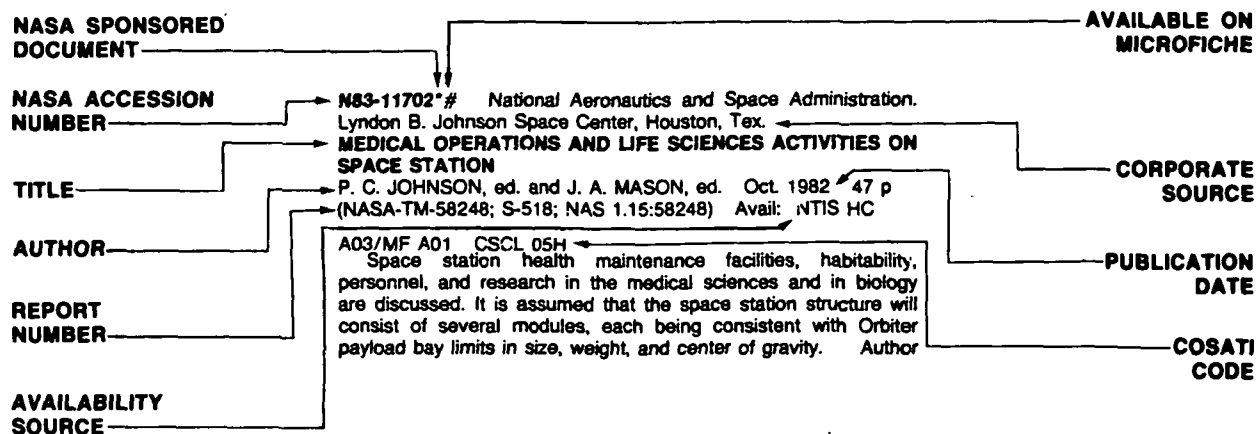
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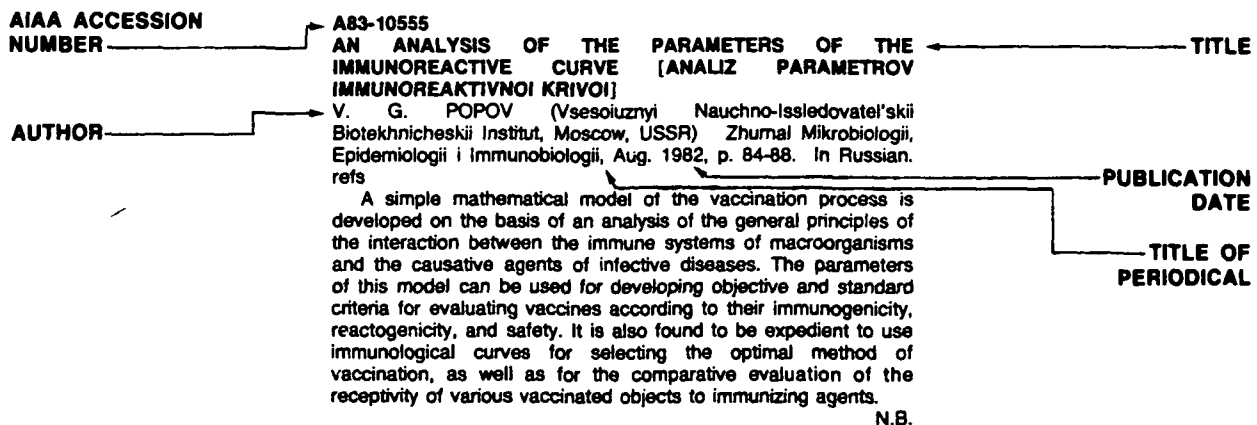
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AEROSPACE MEDICINE AND BIOLOGY

(A Continuing Bibliography (Suppl. 246))

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LIFE SCIENCES (GENERAL)

Includes genetics.

A83-23875

BETA ADRENERGIC BLOCKADE AND ERYTHROPOIETIC PRODUCTION IN RATS AFTER HYPOXIA AND HYPOVolemIA
A. P. LOGOFETOV and N. D. NACHEV (Meditsinska Akademiia, Sofia, Bulgaria) Bolgarskaia Akademiia Nauk, Doklady, vol. 35, no. 11, 1982, p. 1581, 1582. refs

A83-24926

DNA DAMAGE DURING THE ACTION OF IONIZING RADIATION WITH DIFFERENT PHYSICAL CHARACTERISTICS [POVREZHDENIIA DNK PRI VOZDEISTVII IONIZIRUIUSHCHIKH IZLUCHENII RAZNYKH FIZICHESKIKH KHARAKTERISTIK]
KH. ABEL and G. ERTSGREBER (Ob'edinennyi Institut ladernykh Issledovani, Dubna, USSR) Radiobiologiya, vol. 23, Jan.-Feb. 1983, p. 14-20. In Russian. refs

A quantitative evaluation of the number of breaks in DNA strands as a function of LET is presented in order to determine the relationship between the types of ionizing radiation and the DNA damage they induce. The studies involve estimations of the single and double strand breaks in the DNA from various mammals and radiation from ions of C-12 and He-4, gamma-rays, and alpha rays, among others. The significance of the type of break for cell inactivation is examined, focusing on the organization of cellular DNA after irradiation. N.B.

A83-24927

THE TRANSPORT AND TURNOVER OF ALDOLASE IN RAT LIVERS DURING TOTAL BODY IRRADIATION WITH X-RAYS [TRANSPORT I OBOROT AL'DOLAZY PECHENI KRYIS PRI OBNICHEM RENTGENOVSKOM OBLUCHENII]
V. P. KOMOV, A. G. BEKDZHANIAN, and N. V. KIRILLOVA (Khimiko-Farmatsevticheskii Institut, Leningrad, USSR) Radiobiologiya, vol. 23, Jan.-Feb. 1983, p. 27-30. In Russian. refs

A83-24928

A COMPARATIVE ANALYSIS OF THE EFFECT OF ALKYLATING AGENTS, IONIZING RADIATION, AND ULTRAVIOLET RADIATION ON THE PROGRESSION OF MAMMALIAN CELLS THROUGH THE MITOTIC CYCLE. II - THE EFFECT OF GAMMA-RADIATION AND N-METHYL-N'-NITRO-N-NITROSOGUANIDINE ON DNA SYNTHESIS IN HELA CELLS [SRAVNITEL'NYI ANALIZ VLIANIIA ALKILIRUIUSHCHIKH AGENTOV, IONIZIRUIUSHCHIKH I ULTRAFIOLETOVOGO IZLUCHENII NA PROGRESSIIU KLETOK MLEKOPITAIUSHCHIKH PO MITOTICHESKOMU TSIKLU. II - VLIANIE GAMMA-IZLUCHENIIA I N-METIL-N'-NITRO-N-NITROZOGUANIDINA NA SINTEZ DNK V KLETKAKH HELA]

G. B. BELOSTOTSKAIA and O. V. MALINOVSKII (Akademiia Nauk SSSR, Leningradskii Institut ladernoi Fiziki, Gatchina, USSR) Radiobiologiya, vol. 23, Jan.-Feb. 1983, p. 44-49. In Russian. refs

A83-24929

THE RESONANCE INTERACTION BETWEEN LOW-INTENSITY MICROWAVE RADIATION IN THE MILLIMETER RANGE AND HEMOGLOBIN [REZONANSNOE VZAIMODEISTVIE SVERKHOVYSOKOCHASTOTNOGO IZLUCHENIIA MILLIMETROVOGO DIAPAZONA MALOI INTENSIVNOSTI S GEMOGLOBINOM]

N. D. DEVIATKOV, N. P. DIDENKO, V. I. ZELENTSOV, S. V. ZOLOTOV, V. F. TSARIK, and V. A. CHA (Tomskii Politekhnikeskii Institut, Tomsk, USSR) Radiobiologiya, vol. 23, Jan.-Feb. 1983, p. 80-83. In Russian.

The interaction of low-intensity microwave radiation in the millimeter range with molecules of hemoglobin from rats was investigated using Moessbauer spectroscopy. The irradiation of the hemoglobin with the electromagnetic radiation was conducted in the range of 44.5-50.35 GHz at a descending power of approximately 10 mW/sq cm. Results showed 11 frequencies where the resonance interaction of the radiation and the hemoglobin was detected by the appearance of an additional doublet within the Moessbauer spectrum of hemoglobin. N.B.

A83-24930

THE PATTERN OF THE CONDUCTIVITY AND THE PERMEABILITY OF CELLS AT SHORT PERIODS FOLLOWING GAMMA-IRRADIATION [DINAMIKA ELEKTROPROVODNOSTI I PRONITSAEOSTI KLETOK V RANNIE SROKI POSLE GAMMA-OBLUCHENIIA]

B. I. POLIVODA (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiya, vol. 23, Jan.-Feb. 1983, p. 88-90. In Russian. refs

A83-24931

THE COMPARATIVE RADIOPROTECTIVE EFFECT OF ADENYLATES DURING SHORT-TERM AND LONG-TERM GAMMA-IRRADIATION [SRAVNITEL'NAIA PROTIVOLUCHEVAIA AKTIVNOST' ADENILATOV PRI KRATKOVREMENNOM I PROLONGIROVANNOM GAMMA-OBLUCHENII]

M. V. TIKHOMIROVA and P. N. IASHKIN (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Radiobiologiya, vol. 23, Jan.-Feb. 1983, p. 100-104. In Russian. refs

A83-24932

THE REACTION OF CHRONICALLY IRRADIATED DOGS TO RADIATION AS EVALUATED BY CHANGES IN THE ACTIVITY OF CHOLINESTERASE [REAKTSIIA KHRONICHESKI OBLUCHENNYKH SOBAK NA LUCHEVUIU NAGRUZKU, OTSENIVAEMAI PO IZMENENIIAM AKTIVNOSTI KHOLINESTERAZ]

A. A. AKHUNOV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Radiobiologiya, vol. 23, Jan.-Feb. 1983, p. 104-106. In Russian. refs

A83-24933

SOME EVALUATIONS OF THE INTERSPECIFIC DIFFERENCES IN THE VALUES OF THRESHOLD POWER FLUX DENSITIES DURING THE NONTHERMAL ACTION OF NONIONIZING RADIATION [NEKOTORYE OTSENKI MEZHVIDOVYKH RAZLICHII V ZNACHENIIAKH POROGOVYKH PLOTNOSTEI POTOKA MOSHCHNOSTI PRI NETERMICHESKOM DEISTVII NEIONIZIRUIUSHCHEI RADIATSII]

V. G. TIAZHELOVA and V. V. TIAZHELOV (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Radiobiologiya, vol. 23, Jan.-Feb. 1983, p. 122-125. In Russian. refs

The interspecific ratios of the threshold of ionizing radiation flux densities are evaluated for humans, dogs, and mice. These ratios are determined utilizing the assumption that mammals have similar sensitivities to acute radiation regarding the absorbed and power densities for different sized animals with varying rates of metabolic processes. The frequencies of radiation considered range from 10 to 10 to the 20th Hz. N.B.

A83-25151

THE HEMODYNAMIC REACTIONS OF ANIMALS TO EPISODIC STIMULATIONS OF THE VENTROMEDIAL HYPOTHALAMUS DURING ACUTE EMOTIONAL STRESS [GEMODINAMICHESKIE REAKTSII ZHIVOTNYKH NA EPIZODICHESKIE RAZDRAZHENIIA VENTROMEDIAL'NOGO GIPOTALAMUSA V DINAMIKE OSTROGO EMOTSIONAL'NOGO STRESSA]

D. F. VEDIAEV and S. K. SUDAKOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Fiziologicheskii Zhurnal, vol. 29, Jan.-Feb. 1983, p. 35-42. In Russian. refs

A83-25153

THE SYMPATHICOADRENAL SYSTEM DURING HYPOXIC CONDITIONS [SIMPATO-ADRENALOVAIA SISTEMA V GIPOKSICHESKIKH USLOVIAKH]

N. N. NAGNIBEDA (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal, vol. 29, Jan.-Feb. 1983, p. 53-61. In Russian. refs

The changes in the content of catecholamines in the brain (cortex, hypothalamic region) and in the adrenal and biological fluids (blood, urine) were studied in rates in order to characterize the activity of the sympathicoadrenal system at various levels of acute oxygen deficiency (16, 14, 12, 10, 8, 7, 6, and 5.3% of oxygen in nitrogen) and chronic hypoxic hypoxia (living in mountains at various heights). Results show that the excitation of the sympathicoadrenal system and the increase in the secretion of catecholamines during oxygen deficiency are protective reactions resulting from an increase in the power of the systems participating in the reaction of the body to this factor. N.B.

A83-25154

THE HISTOCHEMICAL AND ULTRASTRUCTURAL CHARACTERISTICS OF THE NEURON REACTIONS OF MAMMARY NUCLEI IN OLD ANIMALS TO INJECTIONS OF ADRENALINE [GISTOKHIMICHESKIE I UL'TRASTRUKTURNYE OSOBENNOSTI REAKTSII NEIRONOV MAMILLIARNYKH IADER STARYKH ZHIVOTNYKH NA VVEDENII ADRENALINA]

N. A. MEZHIBORSKAIA (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal, vol. 29, Jan.-Feb. 1983, p. 62-67. In Russian. refs

A83-25155

A STUDY OF THE PROTECTIVE PROPERTIES OF NICOTINAMIDE AND CYTOCHROME C DURING AMINOGLYCOSIDE OTOTOXICOSIS [IZUCHENIE PROTEKTIVNYKH SVOISTV NIKOTINAMIDA I TSITOKHROMA C PRI AMINOGLIKOZIDNOM OTOTOKSIKOZE]

E. A. BAKAI and L. B. NESCHETNAIA (Kievskii Institut Otolaringologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal, vol. 29, Jan.-Feb. 1983, p. 68-73. In Russian. refs

The effect of nicotinamide and cytochrome C on the ototoxic properties of the aminoglycoside antibiotic monomycin was investigated in experiments with guinea pigs. The effects of the drugs were evaluated using cochlear microphonics and cochlear nerve action potential data following ten-day treatments of the animals with combinations of monomycin and each of the two drugs. Results show a significant protective effect of nicotinamide and cytochrome C against the toxic action of monomycin on the peripheral part of the auditory analyzer which depends on the dose of the antibiotics. N.B.

A83-25157

THE EFFECT OF MULTIPLE EXPOSURES TO RADIATIVE HEAT ON THE RESISTANCE OF THE BODY TO CONVECTIVE HEATING AND TOTAL COOLING [VLIANIE MNOGOKRATNYKH VOZDEISTVII LUCHISTOGO TEPLA NA USTOICHIVOST' ORGANIZMA K KONVEKSIONNOMU NAGREVANIU I OBSHCHEMU OKHLAZHDENIU]

S. A. PEVNYI (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR) Fiziologicheskii Zhurnal, vol. 29, Jan.-Feb. 1983, p. 79-84. In Russian. refs

A four-week acclimation to bilateral infrared heating is shown to lead to a decrease in the stability of dogs to strong convective heating. Human males adapted to infrared heating were also found to show a low stability to strong convective heating, including greater increases in the thermoregulatory reactions and a higher level of hyperthermia than for individuals in the control group. However, acclimation to infrared heating did not significantly alter the reaction to moderate and slight cooling. It is concluded that multiple infrared heating lowers the stability of an organism to strong convective heating without noticeable changes in its stability to cooling. N.B.

A83-25158

THE CHARACTERISTICS OF THE THERMOREGULATION IN RATS ADAPTED TO HEAT DURING THE EFFECT OF COLD [USOBENNOSTI TERMOREGULIATSII ADAPTIROVANNYKH K TEPLU KRYYS PRI VOZDEISTVII KHOLODA]

IU. I. ROSSOMAKHIN and S. A. PEVNYI (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR) Fiziologicheskii Zhurnal, vol. 29, Jan.-Feb. 1983, p. 92-96. In Russian. refs

The effect of various regimes of adaptation to heat on the thermoregulatory reactions of rats to cooling is investigated. Results show that the ability of rats to sustain their body temperatures during cooling is not decreased by increasing the periods of adaptation to heat, in spite of adjustments in thermoregulation and increases in the thermal stability. This reaction is related to the greater activity of the switching mechanisms of thermogenesis and their greater stress. During the adaptation of rats to heat, and increase in the intensity of shivering in cold conditions is observed simultaneously with increases in the gas metabolism reactions to cold. The thermoregulatory reactions and temperature

stability during the cooling of rats adapted to heat is found to depend on the type and the length of the adaptations which condition the character and level of the adjustment reactions of thermoregulation. N.B.

A83-25168

THE PROBLEM OF TISSUE ADAPTATION TO HYPOXIA [K PROBLEME TKANEVOI ADAPTATSII K GIPOKSII]

E. S. MAILIAN, L. B. BURAVKOVA, and E. A. KOVALENKO (Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, Jan.-Feb. 1983, p. 14-17. In Russian. refs)

The effects of acute hypoxia on oxidative phosphorylation and glycolysis in the cerebral hemispheres of rats were investigated following the training of the rats in a pressure chamber. It is found that the oxidative systems of the brain become activated as a result of hypoxic acclimation, which is manifested by the increase of energy coupling and the acceleration of phosphorylation during hypoxic exposures. Animals adapted to hypoxia exhibit a lesser degree of oxygen debt. It is concluded that the increased resistance of animals acclimated to hypoxia is determined not only by systemic but also by tissue mechanisms. N.B.

A83-25169

THE CONTRACTILE FUNCTION OF THE HEART AND THE ULTRASTRUCTURE OF THE CARDIOMYOCYTES DURING PROLONGED HYPOKINESIA IN GROWING ANIMALS [SOKRATITEL'NAIA FUNKSIYA SERDTSA I UL'TRASTRUKTURA KARDIOMIOTSITOV PRI DITEL'NOI GIPOKINEZII U RASTUSHCHIKH ZHIVOTNYKH]

F. Z. MEERSON, A. I. SAULIA, G. GUSKI, G. VASILEV, L. M. BELKINA, G. I. MARKOVSKAYA, M. V. SHIMKOVICH, V. A. SALTYSKOVA, and V. V. MALYSHEV (Akademiya Meditsinskikh Nauk SSSR, Moscow, USSR; Berlin, Humboldt-Universitaet, Berlin, East Germany) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, Jan.-Feb. 1983, p. 27-33. In Russian. refs

The basic parameters of the contractile function of the papillary muscle and the ultrastructure of the myocardium were studied in rats in order to determine the effect of a two-month period of hypokinesia. Results show that the amplitude and rate of the contraction and relaxation of the papillary muscle increased by 1.5 times following prolonged hypokinesia. The negative inotropic effect during acidosis was equivalent for both experimental and control animals, while with $Ca(2+)$ deficiency and excess the inotropic reaction during hypokinesia was 1.5-2 times that of the control animals. However, the volume and surface of the longitudinal canaliculi of the sarcoplasmic reticulum of the cardiomyocytes were reduced by 57% during hypokinesia, while the volume and surface of the T system were reduced by 60%. It is concluded that experimental hypokinesia in rats is not analogous to long-term rest or weightlessness in humans for studies of the contractile function of the heart. N.B.

A83-25170

THE CONTENT OF CREATINE PHOSPHATE AND THE ACTIVITY OF CREATINE PHOSPHOKINASE IN THE MITOCHONDRIA OF CARDIOMYOCYTES IN MYOCARDIAL INFARCTIONS IN RATS SUBJECTED TO EMOTIONAL AND PAINFUL STRESS [SODERZHANIE KREATINFOSFATA I AKTIVNOST' KREATINFOSFOKINAZY V MITOKHONDRIYAKH KARDIOMIOTSITOV PRI INFARKTE MIOKARDA U KRYSA, PODVERGNUTYKH DEISTVIU EMOTSIONAL'NO-BOLEVOGO STRESSA]

V. V. DAVYDOV, V. P. TVERDOKHLIB, and V. S. IAKUSHEV (Orenburgskii Meditsinskii Institut, Orenburg, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, Jan.-Feb. 1983, p. 33-36. In Russian. refs

A83-25171

THE EFFECT OF THE PHARMACOLOGICAL BLOCKING OF THE ALPHA AND BETA ADRENORECEPTORS ON THE DEVELOPMENT OF EXPERIMENTAL HIGH-ALTITUDE ACUTE PULMONARY EDEMA [VLIYANIE FARMAKOLOGICHESKOI BLOKADY ALPHA- I BETA-ADRENORETSEPTOROV NA RAZVITIE EKSPERIMENTAL'NOGO VYSOTNOGO OSTROGO OTEKA LEGKIKH]

E. M. ISMAILOV (Kirgizskii Nauchno-Issledovatel'skii Institut Kardiologii; Kirgizskii Meditsinskii Institut, Frunze, Kirgiz SSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, Jan.-Feb. 1983, p. 52-55. In Russian. refs

The effect of a pharmacological blocking of the alpha and beta adrenoreceptors on the frequency, the degree of severity, and the action of several physiological systems during experimental high-altitude acute pulmonary edema is investigated in rabbits. Results show that the pharmacological blocking of the beta adrenoreceptors induces shifts in the gas metabolism and the hemodynamics of the animals during hypoxic hypoxia and leads to increases in the frequency and the degree of severity of high-altitude acute pulmonary edema. However, blocking the alpha adrenoreceptors significantly decreases the risk of developing high-altitude acute pulmonary edema. N.B.

A83-25666

ANOTHER FUNCTION OF THE INNER EAR - FACILITATION OF THE EMETIC RESPONSE TO POISONS

K. E. MONEY and B. S. CHEUNG (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) Aviation, Space, and Environmental Medicine, vol. 54, Mar. 1983, p. 208-211. refs

(Contract N00014-77-G-0077)

If a foot were surgically removed and it was observed that walking was then impaired, it could be concluded that the foot is part of the normal mechanism for walking and that one of the physiological functions of the foot is to facilitate walking. In seven dogs, the vestibular apparatus of the inner ear was surgically removed and it was observed that the emetic response to certain poisons was impaired. It was concluded that the inner ear is part of the normal mechanism for vomiting in response to poisons, and that one of the physiological functions of the inner ear is to facilitate the emetic response to poisons. It seems likely that the mechanism, whereby the vestibular apparatus facilitates the emetic response to poisons, is the basis of motion sickness. In essence, motion sickness can be considered the result of activation, by motion, of a mechanism that normally functions to facilitate vomiting in response to poisons. (Author)

A83-25668

AN EVALUATION OF PLASMA VOLUME EXPANDERS IN THE TREATMENT OF DECOMPRESSION SICKNESS

D. A. MERTON, W. P. FIFE, and D. R. GROSS (Texas A & M University, College Station, TX) Aviation, Space, and Environmental Medicine, vol. 54, Mar. 1983, p. 218-222. refs

(Contract PHS-210-81-6103; NOAA-NA-81AAD00092)

Each of 29 goats was instrumented with an ultrasonic flowmeter transducer around the left common carotid artery and a silastic catheter in the anterior vena cava. Following recovery from the surgery the goats were subjected to a dive protocol designed to elicit symptoms of decompression sickness (DCS). The goats were returned to the surface and, following a 20-min observation period, were either left untreated (controls) or treated with one of five different plasma volume expanders. The plasma volume expanders were evaluated based on their ability to decrease the severity of DCS and the number of arterial bubbles that could be counted. Analysis of the results shows that all of the five plasma volume expanders used appeared to reduce the severity of the signs of DCS and to decrease the number of arterial bubbles detected but that these tendencies were not statistically significant except for Mannitol and Dextran 40. Animals that did not develop arterial bubbles tended to respond better to fluid therapy than did those that did develop bubbles. (Author)

A83-25670

METABOLIC EFFECT OF INTERMITTENT EXPOSURE TO ALTITUDE STRESS ON RATS AND GUINEA PIGS

K. MUKHERJEE and N. C. GHOSH (University College of Science and Technology, Calcutta, India) Aviation, Space, and Environmental Medicine, vol. 54, Mar. 1983, p. 236-240. refs

Growing rats during intermittent exposure to altitude stress of 5486.4 m, lost weight; the loss during a 2-week period was 50% compared to controls. When the stress was withdrawn the rats began to gain weight normally. The activities of proteolytic enzymes (pepsin and trypsin) were found to be significantly increased under the influence of stress. In thyroxine-injected guinea pigs (16 micrograms/kg) the activities are more pronounced. (Author)

A83-26300

A WINDOW ON THE SLEEPING BRAIN

A. R. MORRISON (Pennsylvania, University, Philadelphia, PA) Scientific American, vol. 248, Apr. 1983, p. 94-102.

Experimental results from attempts to disconnect the sleep paralysis mechanism from cats in REM sleep by precise lesions of the brain are reported. Movement of the voluntary muscles in REM sleep is normally inhibited, but by destroying certain sections of the pons with a heated wire cats have been made to stand and enact hunting motions while asleep. Two mechanisms have been characterized and involve the release of muscle tone and the locomotion drive. Burning out a section of the pons breaks the inhibitory neural chain originating in the medulla. It has been determined that the altered cats which lacked atonia during REM sleep also become more inquisitive and explorative during waking hours. It is suggested that a neutral connection exists between arousal states and REM sleep, i. e., heightened alertness is accompanied by reduced motor activity. Various models of the neural pathways that could control movements in REM sleep are discussed. M.S.K.

A83-26786

THE EYE MOVEMENTS OF CATS INDUCED BY THE ELECTRICAL STIMULATION OF THE LATERAL GENICULATE BODY [DVIZHENIIA GLAZ KOSHKI, VYZYVAEMYE ELEKTRICHESKOI STIMULIATSIEI NARUZHNOGO KOLENCHATOGO TELA]

N. F. PODVIGIN, V. I. SVETLOVA, E. V. EVPIATEVA, G. I. NOVIKOV, and S. A. EVDOKIMOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol. 69, Feb. 1983, p. 167-175. In Russian. refs

The effect of the electrical stimulation of the lateral geniculate body structures on goal-directed eye movements was investigated in experiments using unanesthetized cats. Results show that the amplitude and direction of the eye movements depended on the position of the eye at the moment the stimulus was applied, as well as on the placement of the electrodes in the lateral geniculate body. A scheme of the multilevel interactions of the visual and oculomotor systems is presented, and the possible role of the lateral geniculate body in the control of eye movement is discussed. N.B.

A83-26787

THE LOCALIZATION OF THE COLD THERMORECEPTORS IN VARIOUS SKIN LAYERS [O LOKALIZATSII KHOLODOVYKH TERMORESEPTOROV V RAZNYKH SLOIAKH KOZHII]

V. A. KONSTANTINOV, N. K. DANILOVA, and K. P. IVANOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol. 69, Feb. 1983, p. 204-209. In Russian. refs

Impulses from the cold thermoreceptors were measured during changes in the temperature of the surface and deep skin layers of the upper lip in rabbits. The temperature stimulation was carried out using two thermodes placed on both sides of the upper lip. The temperature of the thermodes was rapidly varied from 20 to 40 C and back again in each of the thermodes. A dynamic reaction with sharp changes in the impulse flow was observed in seven out of ten receptors following changes in the temperature of the surface skin thermode, while changes in the temperature of the

deep thermode (2-3 mm under the skin) induced slow alterations in the impulse activity of the same receptors. In three receptors, a dynamic response to changes in the impulse frequency only occurred during changes in the temperature of the deep thermode. It is concluded that thermoreceptors can be located in various layers of the skin and register the skin temperature gradient or the heat flux across the skin. In addition, a mechanism for the maintenance of temperature homeostasis is proposed based on these findings. N.B.

A83-26788

THE ARCHITECTONICS OF THE ARTERIAL BED IN THE BRAIN HEMISPHERES OF RATS DURING NORMAL CONDITIONS AND AFTER A STAY AT A 'HEIGHT' OF 5600 M [ARKHITEKTONIKA ARTERIAL'NOGO RUSLA POLUSHARII GOLOVNOGO MOZGA U KRYS V NORME I POSLE PREBYVANIIA NA 'VYSOTE' 5600 M]

Z. K. VYMIATNINA, V. I. BROD, and K. A. SHOSHENKO (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR; Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Fiziologicheskii Zhurnal SSSR, vol. 69, Feb. 1983, p. 220-226. In Russian. refs

A postmortem morphometrical study of the arterial bed of the brain hemispheres was conducted on rats after a 90-day stay (for 36 hr/week) in a barochamber at a simulated altitude of 5600 m. The blood vessels were filled with a finely-dispersed oil. Results show that these rats had significantly larger diameters of the arteries, greater coefficients of the branching of the arteries, smaller distances between branches, slightly larger angles of branch deviation, and longer capillary beds than observed in control animals. Calculations based on these data show that during hypoxia, the number of arterial vessels and capillaries declines, while the length and linear blood flow velocity of the vessels and capillaries diminish. In addition, the values of the gradient of the pressure head and of the head in the vascular bed decrease during hypoxia. N.B.

A83-26790

THE THERMOREGULATORY ACTIVITY OF THE INTERCOSTAL MUSCLES IN CONDITIONS OF A HYPERCAPNIC LOAD [TERMOREGULIATORNAIA AKTIVNOST' MEZHREBERNYKH MYSHTS V USLOVIAKH GIPERKAPNICHESKOI NAGRUKKI]

L. E. BURACHEVSKAIA (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR) Fiziologicheskii Zhurnal SSSR, vol. 69, Feb. 1983, p. 252-257. In Russian. refs

The reactions of the motor units of the intercostal muscles activated during shivering to the effects of hypercapnia induced by breathing air having a high concentration of CO₂ were investigated in experiments using cats. Results show that the excitation of the respiratory center during shivering influences both the respiratory and the tonic motor units. A majority of the respiratory motor units increased their average rate of firing by 1.5 impulses/sec during conditions of hypercapnia. The tonic motor units not only decreased their average firing rate, but also changed the pattern of firing in reaction to hypercapnic stimulations. The tonic motor units began to discharge in bursts of spikes synchronous with the respiratory rhythm. N.B.

A83-26791

THE TRANSMEMBRANE POTENTIALS OF THE HEART CELLS OF RATS DURING FIBRILLATION INDUCED BY A DECREASE IN EXTRACELLULAR SODIUM [TRANSMEMBRANNYE POTENTIALY KLETOK SERDTSIA KRYS PRI FIBRILLATSII, VYZVANNOI UMENYSHENIEM VNEKLETOCHNOGO NATRIIA]

V. I. KOBRIN, V. V. ALABOVSKII, and V. A. KLEVTSOV (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow; Voronezhskii Gosudarstvennyi Meditsinskii Institut, Voronezh, USSR) Feb. 1983 2 p refs In RUSSIAN

N83-19418* University of Southern Illinois, Carbondale. Dept. of Botany.

ORIGIN AND EVOLUTION OF OSMOREGULATORY MECHANISMS IN BLUE-GREEN ALGAE AS A FUNCTION OF METABOLIC AND STRUCTURAL COMPLEXITY: REFLECTIONS OF PRECAMBRIAN PALEOBIOLOGY Semiannual Status Report, 15 Jun. - Dec. 1982

J. H. YOPP, D. R. TINDALL, and D. M. MILLER 31 Dec. 1982 47 p refs

(Contract NAGW-344)

(NASA-CR-169929; NAS 1.26:169929) Avail: NTIS HC A03/MF A01 CSCL 06C

Twenty-four of the twenty-nine cyanobacteria proposed for culture were successfully cultured. Betaines are discussed.

Author

N83-19419* Arizona Univ., Tucson. Dept. of Biochemistry. **SKELETAL MUSCLE METABOLISM IN HYPOKINETIC RATS** Semiannual Progress Report, 1 Sep. 1982 - 28 Feb. 1983

M. E. TISCHLER 1982 13 p refs

(Contract NAGW-227)

(NASA-CR-169972; NAS 1.26:169972) Avail: NTIS HC A02/MF A01 CSCL 06C

Amino acid metabolism in hypokinesia is discussed. The effects of passive stretching of muscles in hypokinesia are considered.

Author

N83-19420* Health Effects Research Lab., Research Triangle Park, N. C.

SHORT-TERM BIOASSAYS IN THE ANALYSIS OF COMPLEX ENVIRONMENTAL MIXTURES 2

M. D. WATERS, S. S. SANDHU, J. L. HUISINGH, L. CLAXTON, and S. NESNOW Mar. 1982 499 p refs Proc. of the US EPA's 2nd Symp., Williamsburg, Va. 4-7 Mar. 1980 (Contract W-7405-ENG-48; EPA-79-D-X0826)

(PB82-233172; EPA-600/9-82-004) Avail: NTIS HC A21/MF A01 CSCL 06T

A number of topics related to bioassays are discussed. Ambient air, water and soil analysis is discussed. The sources of environment pollution mobile source emissions, industrial emissions and effluents are discussed. Risk assessment and health hazards are discussed.

Author (GRA)

N83-19421* Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

IMPACT INJURY CAUSED BY LINEAR ACCELERATION: MECHANISMS, PREVENTION AND COST

J. L. HALEY, JR., ed. (Army Aeromedical Research Lab.) London Oct. 1982 495 p refs In ENGLISH and FRENCH Conf. held in Cologne, 26-29 Apr. 1982

(AGARD-CP-322; ISBN-92-835-0317-0) Avail: NTIS HC A21/MF A01

Spinal column injuries under compressive, bending, and tensile loads; leg, head, and neck injuries; injury data collection; injury preventing hardware; seat/man models; and crashworthiness are addressed.

N83-19422* Purdue Univ., Lafayette, Ind. Dept. of Anatomy. **CHRONIC EFFECTS OF +G SUB Z IMPACT ON THE BABOON SPINE**

D. C. VANSICKLE and L. E. KAZARIAN (AFAMRL) In AGARD Impact Injury Caused by Linear Acceleration: 3 p Oct. 1982 refs

Avail: NTIS HC A21/MF A01

A detailed time lapse anatomical study of degenerative changes very similar to human spondylosis deformans is provided. Traumatic spondylosis deformans was found to occur without radiographically detectable vertebral fracture. In the baboon, radiographic examination on the day of exposure to excessive mechanical stress will reveal no significant radiographic changes, but that the subsequent appearance of spondylosis deformans strongly suggests that the pathological changes are the direct result of trauma.

Author

N83-19426* Laboratoire Central de Biologie Aerospatiale, Paris (France). Service de Biomecanique.

STUDY IN THE IMPULSE AND IN VIVO REGIME OF THE TRANSMISSIVITY OF THE INTERVERTEBRAL LUMBAR DISKS OF A PRIMATE [ETUDE EN REGIME IMPULSIONNEL ET 'IN VIVO' DE LA TRANSMISSIBILITE DES DISQUES INTERVERTEBRAUX LOMBAIRES D'UN PRIMATE]

P. QUANDIEU, L. PELLIEUX, B. GARNIER (Soc. MEREAIVB), P. BORREDON, B. VALEZY, and B. PIEDECOCQ In AGARD Impact Injury Caused by Linear Acceleration: 21 p Oct. 1982 refs In FRENCH

Avail: NTIS HC A21/MF A01

By analogy with methods for analyzing the behavior of industrial structures, the hypothesis is presented that the propagation of shock and vibration in the vertebral column can be understood by determining the transfer function of the intervertebral disk. The transfer function is defined and the conditions for its use are reviewed. The method used and the protocol followed are described in the study of the propagation of consecutive vibrations from shock applied directly to the sacrum of a low weight primate (young baboon). The linearity of the vertebral response is examined and the velocity of the group and the phase of propagated waves is calculated. This study complements a previous investigation of the discal behavior, in vivo and in situ, in the vibratory regime in a chronically bioinstrumented animal.

Transl. by A.R.H.

N83-19436* Naval Biodynamics Lab., New Orleans, La. **NEUROPATHOLOGY OF THE RHESUS MONKEY UNDERGOING -GX IMPACT ACCELERATION**

F. UNTERHARNSCHIEDT (Neuroscience, Inc.) In AGARD Impact Injury Caused by Linear Acceleration: 34 p Oct. 1982 refs (Contract N00014-78-C-0800)

Avail: NTIS HC A21/MF A01

Each vector direction of impact acceleration produces a different and predictable type of injury in regard to quality and distribution. The specific neuropathological injury pattern in -Gx acceleration transmitted indirectly to the head via the vertebral column consists of tissue damage at the zone of maximum stretched at the atlanto-occipital junction, if the threshold is reached, incomplete and complete traumatic transection of the spinal cord and rupture of both vertebral arteries and concomitant basilar and spinal subarachnoid and subdural hemorrhages. Furthermore at peak sled acceleration levels low enough that neither incomplete nor complete transections occurred, a local indentation of tissue was seen at the ventral fissure, apparently caused by direct impact of the tip of the odontoid process of the axis. In some instances, subdural hemorrhages over both cerebral hemispheres due to ruptured bridging veins were seen, probably as the result of rotational acceleration. As we have demonstrated before, a neurophysiological and neuropathological continuum from no lesions to severe and lethal ones can be demonstrated, described and quantified. The head-neck and brain-cord systems can be described by input-output relationships. Each effective mechanical input to the head and neck corresponds to a predictable and typical morphological end state.

Author

N83-19437* Centre d'Essais en Vol, Bretigny-Air (France).

RESEARCH ON PROTECTING THE VERTEBRAL COLUMN FROM EJECTION ACCELERATIONS [RECHERCHE CONCERNANT LA PROTECTION DE LA COLONNE VERTEBRALE]

F. COUSSAU, B. VETTES, and G. BEZAMAT In AGARD Impact Injury Caused by Linear Acceleration: 10 p Oct. 1982 In FRENCH

Avail: NTIS HC A21/MF A01

A pneumatic solution was used in the design of equipment to relieve the vertebral column of chase pilots during ejection. Inflatable structures called girders were set up, capable of supporting large forces. These girders were used to construct equipment, and to verify the validity of the principles held. Tests on a dummy and a human subject were conducted by the Flight Test Center. The Aerospace Medicine Laboratory demonstrated that such equipment was capable of decreasing 50% of the forces

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transmitted to the seat by the vertebral column. A useable prototype for the aircraft environment, as well as its inflation at the moment of ejection were studied. Transl. by A.R.H.

N83-20531# Michigan State Univ., East Lansing. Dept. of Biomechanics.

MECHANICAL PROPERTIES OF LOWER LIMB TENDONS AND LIGAMENTS IN PRIMATES

D. J. SELKE, R. W. LITTLE, R. P. HUBBARD, and A. R. SLONIM
Wright-Patterson AFB, Ohio Aerospace Medical Research Labs.
Jul. 1982 32 p refs
(Contract F33615-79-C-0514; AF PROJ. 7231)
(AD-A120797; AFAMRL-TR-82-56) Avail: NTIS HC A03/MF A01 CSCL 06S

This report covers a study of the material property characteristics of four ligaments and tendons from the lower limbs of primates and is part of a three year study of the mechanical properties of soft connective tissues. The mechanical properties of the medial, collateral, and patellar ligaments of the knee and the flexor hallucis longus and tendo-calcaneus tendons of the ankle of the rhesus monkey, baboon, and chimpanzee were tested. The mechanical test program included establishment of initial tissue geometry, relaxation, constant strain rate, hysteresis, and cyclic relaxation tests. Long term preconditioning stability was monitored throughout the test program. Information on the mechanical properties of the ligaments and tendons is essential to the understanding of injuries that result from escape and crash episodes. Different primate species data will aid in the selection of animal models and interspecies scaling techniques. GRA

N83-20532# Kansas Univ., Lawrence.
MOLECULAR CHARACTERISTICS OF MEMBRANE GLUTAMATE RECEPTOR-IONOPHORE INTERACTION Final Report

H. H. CHANG and E. K. MICHAELIS 15 Oct. 1982 23 p refs
(Contract DAAG29-79-C-0156)
(AD-A121373; ARO-16583.4-LS; REPT-7) Avail: NTIS HC A02/MF A01 CSCL 06A

The excitatory responses produced in mammalian central nervous system neurons and in invertebrate muscles by the action of L-glutamic acid and L-aspartic acid are apparently the result of a glutamate- or aspartate-induced increase in membrane conductance of Na⁺. In our studies, we have used rat brain synaptosomal and synaptic membrane vesicular preparation to study this process. The synaptosomes and resealed synaptic plasma membrane vesicle preparations from brain tissue are thought to consist largely of presynaptic membrane sacs and of a few postsynaptic membrane vesicles. These plasma membrane fractions apparently retain a high degree of functional and structural integrity. In our laboratory, we have shown that these neuronal plasma membrane subfractions are enriched in glutamic acid binding sites. GRA

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

A83-23822

THE PHYSIOLOGY AND PATHOLOGY OF THE VENOUS BLOOD CIRCULATION OF THE LOWER EXTREMITIES [FIZIOLOGIIA I PATOLOGIIA VENOZNOGO KROVOOBRASHCHENIIA NIZHNIKH KONECHNOSTEI]

E. P. DUMPE (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR), I. I. UKHOV (Riazanskii Meditsinskii Institut, Ryazan, USSR), and P. G. SHVALB (Riazanskii Oblastnoi Tsent Sosudistoi Khirurgii, Ryazan, USSR) Moscow, Izdatel'stvo Meditsina, 1982. 168 p. In Russian. refs

The properties of blood circulation in the lower extremities during various types of pathological disruptions of the venous outflow before and after surgical treatment are investigated. Topics considered include the mechanism of the normal venous outflow from the lower extremities, the anatomical features of the venous system and the structure of the venous walls of the lower extremities, and the structural organization of the venous muscular pump. Also examined are the structural changes in the venous walls during varicose and post-thrombotic diseases, the pathological processes connected with insufficiencies of the venous outflow, and the pathogenesis of disorders of venous hemodynamics and the means for their compensation. In addition, methods for the surgical treatment of chronic venous insufficiencies during varicose and post-thrombotic diseases are discussed.

N.B.

A83-23973

THE RESULTS OF AN INVESTIGATION OF THE INTERMITTENT EFFECTS OF LOW TEMPERATURE ON THE HUMAN BODY [REZULTATY ISSLEDOVANIIA PRERYVISTOGO VOZDEISTVIA NIZKOI TEMPERATURY NA ORGANIZM CHELOVEKA]

V. P. KOVALENKO and V. V. PASTUKHOV Voenno-Meditsinskii Zhurnal, Jan. 1983, p. 49-51. In Russian.

The effects on the human body of short periods of low temperature followed by periods at normal room temperature were investigated. The subjects were clothed in standard winter army uniforms and subjected to 1 hr periods at -35 C alternating with 1/2, 1, 1-1/2 hr periods at normal room temperature. The temperature of the body was evaluated using the rectal temperature and 11 measurements of skin temperature. Also measured were the characteristics of the cardiovascular system, the central nervous system, the motor analyzer, and the hypothalamo-hypophysis-adrenal system, as well as other parameters. Results show that even 1-1/2 hr intervals between the exposures to low temperature were insufficient to fully restore the heat condition of the body. Moreover, with shorter intervals (1/2 and 1 hr) between exposures to low temperature, the characteristics of the heat condition of the body did not return to acceptable levels. N.B.

A83-23974

THE CHANGES OF THE PROTEIN METABOLISM CHARACTERISTICS DURING THE ACCLIMATIZATION OF HUMANS IN THE ARCTIC [IZMENENIIA POKAZATELEI BELKOVOGO OBMENA V PROTSESSE AKKLIMATIZATSII CHELOVEKA V ARKTIKE]

A. A. SHABAROV and N. T. SVISTUNOV Voenno-Meditsinskii Zhurnal, Jan. 1983, p. 51-53. In Russian. refs

A83-23975**THE ORGANIZATION OF MEDICAL FACILITIES FOR FLIGHT SAFETY [OPYT ORGANIZATSII MEDITSINSKOGO OBESPECHENIIA BEZOPASNOSTI POLETOV]**

S. A. VARTANOV and A. F. PAKHOMOV Voennno-Meditsinskii Zhurnal, Jan. 1983, p. 54, 55. In Russian.

The results of several different experiments for improving the physical and psychological health of pilots are summarized. It is shown that the psychological fatigue of pilots can be significantly lower between flights by having the pilots relax in a specially equipped room containing comfortable chairs, soothing music, and slides of outdoor scenes. Special medical examinations in the days prior to flying are also found to improve the efficiency of the pilots. Also important in preventing incidents which lower the work capacity of pilots are improvements in the relationship between a pilot and his family and with the flight medical doctor. Special short-term periods of study at advanced aviation medicine facilities can improve the professional abilities of the flight medical doctor.

N.B.

A83-23982**THE CONDITION OF THE HYPOTHALAMIC-HYPOPHYSIAL-ADRENAL SYSTEM DURING SUDDEN CARDIAC DEATH [SOSTOIANIE GIPOTALAMO-GIPOFIZARNNO-NADPOCHECHNIKOVOI Y PRI VNEZAPNOI SERDECHNOI SMERTI]**

R. V. KAPANADZE, L. A. KHOPERIIA, and L. A. KHABAZI (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Nauchno-Issledovatel'skii Institut Klinicheskoi i Eksperimental'noi Kardiologii, Tbilisi, Georgian SSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol. 108, Oct. 1982, p. 177-180. In Russian. refs

The structural changes in the hypothalamic-hypophyseal-adrenal system were investigated in 58 cases of sudden cardiac death. The changes in the structure of the neurons of the supraoptic and paraventricular nuclei of the anterior hypothalamus were determined and the cumulation and consumption of neurosecretory substances in the hypophyseal-hypothalamic tract were examined. Both acute and chronic changes were found in this system after sudden cardiac death. A stimulation of the secretion of hormones occurred shortly before death and these compounds were found to be located near the heart. It is concluded that the exhaustion of the neuron neurosecretory nuclei leads to their dysfunction and to the disruption of their regulating influence on the organs of internal secretion. Consequently, this results in attacks of angina pectoris, disruptions of myocardial metabolism, and decreases in the contractile capability of the myocardium.

N.B.

A83-24002#**VESTIBULAR HABITUATION WITH GIMBAL MOUNTED TUMBLING DEVICE**

S. P. DESHMUKH (Indian Air Force, New Delhi, India), B. N. PRANESHA RAO (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), and K. S. SOODAN Aviation Medicine, vol. 26, Dec. 1982, p. 87-95. refs

The suitability of a gimbal tumbling device as a vestibular habituation device is evaluated by means of exercise training for 12 healthy males between 20-40 years of age. The subjects performed regular exercises on the device for 12 and 16 minutes per day for five days. The exercises consisted of manual rotation through 45, 90, and 360 degrees in the roll, pitch, and yaw planes. The degree of habituation was evaluated by comparing the post-rotatory nystagmus following stimulation of the horizontal semicircular canal before and after the periods of exercise and the maximum velocity of the slow phase was utilized as a parameter for the ENG evaluation. Results showed that 8 of the subjects exhibited a reduction in the ENG response of 20% or greater, while two of the subjects retained this habituation beyond five days.

N.B.

A83-24004#**POSITIVE G TOLERANCE OF INDIAN SUBJECTS - EFFECTS OF AGE AND FLYING EXPERIENCE**

MR. KULDIP RAI (Indian Air Force, New Delhi, India) and P. L. N. RAO (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) Aviation Medicine, vol. 26, Dec. 1982, p. 100-104. refs

The average tolerance values of +Gz in Indian subjects were studied based on results of over 500 male volunteers who had undergone tests on a centrifuge. The subjects were subdivided into different groups according to age and flying experience. Results show that fighter pilots have a higher tolerance than other groups and that this tolerance is higher for senior fighter pilots than for junior and younger fighter pilots. However, an opposite trend of reduced tolerance with increasing age is found in all other groups of subjects. Norms of tolerance values for Indian subjects in all age groups are presented.

N.B.

A83-24005#**EFFECTS OF AGEING ON CARDIORESPIRATORY CHANGES TO MODERATE PHYSICAL EXERCISE**

P. K. BANERJEE, E. M. IYER, and J. S. SANT (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) Aviation Medicine, vol. 26, Dec. 1982, p. 105-109. refs

The changes in several cardiorespiratory functions, such as oxygen consumption, pulmonary ventilation, heart rate, and arterial blood pressure in response to a standard submaximal exercise, are determined for 30 healthy male subjects, 10 each from 20-34, 35-40, and 41-50 years of age in order to assess the age-bound differences. It was found that the heart rate, oxygen consumption, and pulmonary ventilation measured during steady state exercises did not show any age-bound differences, while arterial blood pressure (both systolic and diastolic) showed significantly higher values for subjects in the 41-50 year age group than for those in the younger groups. The rate pressure product (the heart rate times the systolic blood pressure) during exercise was consequently higher in subjects 41-50 years of age, indicating an increased level of myocardial work while performing a moderate physical exercise for subjects in this age group.

N.B.

A83-24006#**ECHOCARDIOGRAPHY IN ASSESSMENT OF CARDIOVASCULAR PROBLEMS OF AIR FORCE PERSONNEL**

M. AKHTAR (Air Force Hospital, Kanpur, India), S. K. PARASHAR (Army Hospital, Delhi, India), B. K. DAS (Command Hospital, Calcutta, India), and G. KUPPUSWAMY (Armed Forces Medical College, Poona, India) Aviation Medicine, vol. 26, Dec. 1982, p. 110-113. refs

The use of noninvasive tests including echocardiography to assess the presence of cardiovascular problems was evaluated in tests involving 71 subjects with cardiovascular problems. Results showed that 16.6% of cases with nonspecific ECG abnormality, 27.58% of cases with ischemic heart disease, and 20% of cases with arrhythmias exhibited evidence of left ventricular dysfunction. In addition, 28% of the cases with undiagnosed systolic murmur showed definite diagnostic patterns by echocardiography in contrast to 12% having suggestive features in graphical recordings by indirect carotid tracings and apex cardiography. It is concluded that echocardiography is a very useful technique for the evaluation of cardiovascular problems among service personnel, including aircrews.

N.B.

A83-24007#**STEREO ACUITY RATING IN DIFFERENT AGE GROUPS AS TESTED ON TITMUS OPTICAL STEREO TESTS**

J. N. SINGHA (Armed Forces Medical College, Poona, India) Aviation Medicine, vol. 26, Dec. 1982, p. 114-118. refs

The stereo acuity rating of sixty subjects in different age groups was determined using the Titmus optical stereo tests. Results show that the stereo acuity rating measured as the reciprocal in seconds of arc disparity declined with age. Subjects with binocular single vision defects had poorer ratings than subjects with no binocular single vision defects. It is concluded that the Titmus optical stereo

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tests are useful in screening the cases for stereopsis and for quantitatively measuring subsequent deterioration. N.B.

A83-24008#

UNUSUAL EJECTION INJURY - A CASE REPORT

M. B. DIKSHIT and A. K. SENGUPTA (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) *Aviation Medicine*, vol. 26, Dec. 1982, p. 119-122. refs

A case history is presented of an injury to a pilot in which one of his hollow abdominal organs became perforated as a result of ejection from a jet fighter aircraft. This pilot developed a subdiaphragmatic gas shadow with paralytic ileus several hours after a low-level ejection during which he suffered a severe compression fracture of his L1 vertebra. The other pilot of this aircraft suffered only a mild compression fracture of his T12 vertebra. N.B.

A83-24009#

A HISTOPATHOLOGICAL STUDY ON HEARTS IN ISCHAEMIC HEART DISEASE FATALITIES

S. K. ADAVAL (Command Hospital, Bangalore, India), G. N. KUNZRU (Air Force Central Medical Establishment, New Delhi, India), R. N. VERMA (Armed Forces Medical College, Poona, India), R. N. DIWAN (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), and V. M. ALURKAR (Military Hospital, Poona, India) *Aviation Medicine*, vol. 26, Dec. 1982, p. 123-127. refs

A histopathological study of 43 hearts recovered during autopsies of patients who died of ischemic heart disease was conducted in order to determine the occlusive status of coronary arteries and its effect on the myocardium. Hearts from patients between 31 and 50 years of age comprised 74.5% of the total number studied. Results showed that the most common vessel involved was the left coronary artery and its anterior descending branch, followed by the right coronary artery and the circumflex branch of the left coronary artery. The most common mode of occlusion was thrombosis associated with atherosclerotic changes (22 cases), while 15 cases of progressive luminal narrowing were detected. Histological evidence of infarction was found in only 39.9% of the cases. All infarctions involved only the left ventricle, primarily the anterior left ventricle. The mechanism of the occlusive pathology of the coronary arteries and its relation to changes in the myocardium is examined. N.B.

A83-25152

AN INVESTIGATION OF THE GENOTYPIC CONDITIONALITY OF THE GAS COMPOSITION AND ACID-BASE STATE INDICATORS OF THE BLOOD DURING VARIOUS EFFECTS ON THE BODY [K ISSLEDOVANIU GENOTIPICHESKOI OBUSLOVLENNOSTI POKAZATELEI GAZOVOGO SOSTAVA I KISLOTNO-OSNOVNOGO SOSTOIANIIA KROVI PRI RAZLICHNYKH VOZDEISTVIIAKH NA ORGANIZM]

T. V. SEREBROVSKAIA and M. M. FILIPPOV (Akademii Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal*, vol. 29, Jan.-Feb. 1983, p. 48-52. In Russian. refs

The degree of genetic determination of the gas composition and acid-base state indicators of the blood was studied in 6 pairs of monozygote twin boys and 6 pairs of dizygote twin boys, all 15-16 years of age, during the action of progressive hypoxia and hypercapnia, as well as physical exercise. Results show that the growing hypoxia does not involve genetic components in the regulation of respiratory gas tension in the arterial blood, although a hereditary effect on the regulation of pH was established. During exogenous hypercapnia, redistribution of the blood and buffer systems and shifts of pH are to a significant extent genetically determined. During intensive physical exercise, the changes in the oxygen and CO₂ tensions are strictly controlled by the genotype, whereas shifts in the acid-base state depend mainly on environmental effects. N.B.

A83-25667

FLIGHT, FLIGHT DUTY, AND REST TIMES - A COMPARISON BETWEEN THE REGULATIONS OF DIFFERENT COUNTRIES

H.-M. WEGMANN, B. CONRAD, and K. E. KLEIN (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Flugmedizin, Cologne, West Germany) *Aviation, Space, and Environmental Medicine*, vol. 54, Mar. 1983, p. 212-217. refs

Flight time, flight duty limitations, and rest requirements are compared between the regulations from nine different countries. Twelve factors are identified which played a role in formulating restrictions and criteria. Duration of flight duty and crew augmentation are the factors considered by most countries; time of day, night flight, night sleep, and time zones are the factors least considered. Conformity exists in the necessity to prescribe maximum permissible flight or duty times and minimum rest requirements on a daily basis. Agreement was also observed in grading the standards according to more or less fatiguing conditions. Six out of nine regulations define night hours, but fail to agree upon beginning, end, and duration of night. All countries but one limit flying hours on a monthly and yearly basis, although the limits diverge. A brief outline of the German provisions is presented as an example for a compact and practicable regulation. (Author)

A83-25669

100% OXYGEN BREATHING DURING ACUTE HEAT STRESS - EFFECT ON SWEAT COMPOSITION

E. M. IYER, M. B. DIKSHIT, P. K. BANERJEE, and S. SURYANARAYANA (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) *Aviation, Space, and Environmental Medicine*, vol. 54, Mar. 1983, p. 232-235. refs

Twelve male subjects are exposed on two occasions to a simulated hot environment (dry bulb, 57°C; wet bulb, 35.5°C; relative humidity, 25%) for 50 min. The subject first breathes normal atmospheric air and breathes 100% oxygen at ambient atmospheric pressure. The arm sweat collected at the end of each experiment is analyzed for Na(+), K(+), Mg(++), Cl(-), and lactic acid. The Mg(++) content is found to be much greater than the values reported in the literature. Hyperoxia during heat stress is found to improve arm sweating and to give significantly lower concentrations of Mg(++), Na(+), K(+), and lactic acid. The total loss of these cations and lactic acid through the arm, however, is not found to differ significantly for the two experiments. The selective retention of Mg(++) during the hyperoxic heat run and its association in lowering the heat-induced physiological strain are discussed. C.R.

A83-25671

MEDICAL STANDARDS FOR EXPERIMENTAL HUMAN USE IN ACCELERATION STRESS RESEARCH

J. E. WHINNERY and K. K. GILLINGHAM (USAF, School of Aerospace Medicine, Brooks AFB, TX) *Aviation, Space, and Environmental Medicine*, vol. 54, Mar. 1983, p. 241-245. refs

Acceleration research is necessary to ensure optimum protection for individuals flying high performance fighter aircraft. Human volunteers exposed to high sustained +Gz stress must be carefully screened to assure that no one is at increased risk for G-induced trauma. Rigorous medical standards for qualifying research subjects must be established and followed. Careful documentation of G-related symptoms and physiologic disturbances enhances the safety aspects of human experimentation. No severe or life-threatening incidents have occurred. A number of symptoms resulting from +Gz exposure have been documented with loss of consciousness being the most frequently documented symptom. The most frequent medical reason for disqualifying an individual volunteer from participation in the acceleration program was because of irregularities noted on spinal X-rays. The current medical standards and clinical diagnostic testing used to screen volunteer subjects at the USAF School of Aerospace Medicine are reviewed along with the symptoms which have resulted over a three year period of high sustained +Gz stress exposures. (Author)

A83-25672

THE MEASUREMENT OF RISK INDICATORS FOR CORONARY HEART DISEASE IN AIR TRAFFIC CONTROL OFFICERS - A SCREENING STUDY IN A HEALTHY POPULATION

V. B. MAXWELL (Civil Aviation Authority, Manchester, England), J. H. CRUMP (University of Manchester Institute of Science and Technology, Manchester, England), and J. THORP (Imperial Chemical Industries, Ltd., Alderly Edge, Ches., England) *Aviation, Space, and Environmental Medicine*, vol. 54, Mar. 1983, p. 246-249. refs

An attempt to improve the predictive value of the routine annual medical examination of Air Traffic Control Officers by extending its scope, is described. In addition to the four well-recognized coronary heart disease risk indicators - age, smoking habit, family history of coronary heart disease, and systolic blood pressure - plasma fibrinogen, serum total, and high-density lipoprotein cholesterol was measured. Relative risk of coronary heart disease was assessed for each subject using a multiple logistic equation, and then compared with a large matched control. There were no statistical differences between the risk factors in the two groups. The factors measured do not support the view that air traffic control produces an increased risk of coronary heart disease, despite the alleged connection between stress and coronary heart disease. However, the gradient of risk within the air traffic control population should be evaluated in those at highest risk. (Author)

A83-25673

A STATISTICAL ANALYSIS OF MOTION SICKNESS INCIDENCE DATA

C. A. MAURO and D. E. SMITH (Desmatics, Inc., State College, PA) *Aviation, Space, and Environmental Medicine*, vol. 54, Mar. 1983, p. 253-257. refs

This paper analyzes motion sickness data that has been obtained from experiments involving the Office of Naval Research motion generator. Based on the analysis, a mixture of two statistical populations has been postulated as an overall model of time to first emesis. Empirical evidence indicates that the sub-population corresponding to early emesis is Weibull. (Author)

A83-25674

DECOMPRESSION SICKNESS - USAF EXPERIENCE 1970-80

R. B. RAYMAN (USAF, Hospital, England AFB, LA) and G. B. MCNAUGHTON (USAF, Air Force Inspection and Safety Center, Norton AFB, CA) *Aviation, Space, and Environmental Medicine*, vol. 54, Mar. 1983, p. 258-260.

During the period 1970-80, there were 58 cases of decompression sickness in one of its forms reported in USAF aircrewmembers. These cases occurred in a number of different types of aircraft in which cabin/cockpit depressurization occurred either intentionally (because of operational requirements) or because of mechanical malfunction. The most common manifestation of decompression sickness was bends, although some airmen experienced various degrees of neurological dysfunction. Even though none of the aircraft was lost or damaged due to crew incapacitation, the threat was clearly there. The authors briefly review decompression sickness including prevention, treatment, and aeromedical disposition. (Author)

A83-26120

NONINVASIVE ECHO-DOPPLER DUPLEX MEASUREMENTS OF COMMON FEMORAL ARTERY BLOOD FLOW VARIABLES DURING SUPINE EXERCISE AND POST-OCCLUSIVE REACTIVE HYPEREMIA

M. F. SUTTON, E. R. GREENE, E. JOHNSON, and P. A. REILLY (Lovelace Foundation for Medical Education and Research, Albuquerque, NM) (Instrument Society of America, Annual Rocky Mountain Bioengineering and Biomedical Sciences Instrumentation Symposium, 19th, Denver, CO, Apr. 19, 20, 1982.) *ISA Transactions*, vol. 22, no. 1, 1983, p. 47-57. refs

The results of tests to determine the feasibility of using an ultrasonic two-dimensional echo-Doppler duplex scanner (DS) to noninvasively measure the common femoral artery blood flow (CFBF) and the common femoral artery stroke volume (CFSV)

are reported. Signals at frequencies of 3.0 or 5.0 MHz were directed toward the arteries of normal subjects during rest, after graded supine exercise, and during post-occlusive reactive hyperemia. Real-time imagery was generated of the blood velocities within the arteries by imaging the walls of the vessel. The system was calibrated by scanning cellular particles in distilled water to simulate erythrocytes at different Re. The 15 subjects were fitted with blood pressure cuffs during the measurements. The DS successfully detected changes in blood flow in a quantitative manner, and tests to extend the technique to use with patients in a diseased and/or stressed state are indicated. M.S.K.

A83-26303

PERFORMANCE DECUREMENT AT CABIN ALTITUDES - A REPLICATION

R. A. BENEL (Essex Corp., Alexandria, VA) and W. F. STORM (USAF, School of Aerospace Medicine, Brooks AFB, TX) In: *Human Factors Society, Annual Meeting*, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 54-58. refs

Several reports have indicated performance decrements may occur at altitudes below those experienced in pressurized aircraft cabins. In order to verify these findings a partial replication of one of these studies was undertaken. Four groups of five subjects learned a complex choice reaction time task (Manikin Task) at ground level and simulated altitudes of 1524 M, 2438 M, and 3048 M (5, 8, and 10,000 ft.). Performance was significantly worse for the altitude groups during the initial trials and marginally worse for the higher two altitudes on the final trials. Consistent with previous findings, performance at altitude was impaired. Since such impairment remains even when a task is fairly well-practiced, it is concluded that asymptotic performance may be affected as well. (Author)

A83-26308

PERFORMANCE PREDICTED FROM BASELINE AUTONOMIC FUNCTIONING

V. J. GAWRON (Calspan Corp., Buffalo, NY) and S. W. PORGES (Illinois, University, Champaign, IL) In: *Human Factors Society, Annual Meeting*, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 79-82. refs
(Contract F46920-77-C-0117; NIH-K02-MH-0054)

Differences in human baseline physiological levels were assessed in relation to differences in cognitive performance. Seventy seated subjects monitored for BPR and galvanic skin response performed the delayed digit cancellation task. The number, mean latency, and latency variability of correct responses were recorded. The Wegner A (1943) measure of the sympathetic/parasympathetic nervous system dominance was calculated, along with the Cw coherence measurement of the covariance level of the respiratory and cardiac activity. High performance accuracy was found to be correlated with accelerated cardiac activity, sympathetic dominance, high diastolic blood pressure, and long respiration. Subjects with low A scores produced more correct responses with greater speed and were characterized by a personality profile questionnaire as more emotional, impatient, and active. D.H.K.

A83-26789

THE EFFICIENCY OF THE PHYSIOLOGICAL CHANGES OF THE HEAT CONDUCTANCE AND THE HEAT AND MASS TRANSFER IN THE SKIN OF HUMANS DURING THERMOREGULATION [EFFEKTIVNOST' FIZIOLOGICHESKIH IZMENENII TEPOPROVODNOSTI I TEPMASSOPERENOSA V KOZHE CHELOVEKA PRI TERMOREGULIATSII]

K. P. IVANOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and I. I. ERMAKOVA (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal SSSR*, vol. 69, Feb. 1983, p. 247-251. In Russian. refs

Results are presented of investigations of the vascular responses of the skin of humans during a decrease in the ambient temperature. A mathematical model of the thermoregulation of

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humans was utilized for these investigations. Results show that when the ambient temperature is decreased from 29 to 16 C, the temperature of the skin only slightly depends on the physiological changes of the blood flow and almost entirely is determined by the ambient temperature. It is concluded that the decrease in thermal output of the body due to the vascular response during a decrease in the ambient temperature is mainly a result of the decrease in heat and mass transfer by the blood, while changes in the heat insulation of the skin play a lesser role. N.B.

A83-26950

VESTIBULAR AND OPTOKINETIC REFLEXES IN ATHLETES [O VESTIBULIARNOM I OPTOKINETICHESKIKH REFLEKSAKH U SPORTSMENOV]

G. A. SHORIN (Cheliabinskii Institut Fizicheskoi Kul'tury, Chelyabinsk, USSR) Vestnik Otorinolaringologii, Mar.-Apr. 1983, p. 18-21. In Russian. refs

The vestibular and optokinetic reflexes of 358 athletes were investigated following the application of graded angular acceleration and progressively increasing optokinetic stimuli. The vegetative, sensory, and somatic responses of the athletes were analyzed. Results show a varying degree of the vestibular resistance to the action of these stimuli. Differences in the qualitative and quantitative evaluations of the electronystagmograms were detected. It is concluded that the basic criterion when evaluating the functional condition of the vestibular analyzer in athletes should be the adequacy of the response (vegetative, sensory, or somatic) to the strength of the applied stimulus. N.B.

N83-19423# California Univ., San Diego. Medical Center. MECHANISMS OF HEAD IMPACT INJURY AND MODIFICATION BY HELMET PROTECTION

A. M. NAHUM and C. WARD (Biodynamic/Engineering, Inc.) In AGARD Impact Injury Caused by Linear Acceleration: 29 p Oct. 1982 refs
Avail: NTIS HC A21/MF A01

Head protection provided by helmets or padding on the impacted cadaver skull surface was examined. Using unembalmed human cadaver subjects, frontal and lateral head impacts were conducted. Head acceleration and intracranial pressures were measured in order to determine the head and brain responses. Brain response was further analyzed with the aid of a finite element brain model; each impact was simulated on the computer to determine brain stresses and displacement during the impact. The degree of protection provided can be quantified by comparing head acceleration and brain pressures for equivalent energy impacts. Author

N83-19424# Heidelberg Univ. (West Germany). Inst. of Forensic Medicine.

DYNAMIC FRONTO-OCCIPITAL HEAD LOADING OF HELMET-PROTECTED CADAVERS

R. MATTERN, F. SCHUELER, and G. SCHMIDT In AGARD Impact Injury Caused by Linear Acceleration: 11 p Oct. 1982 refs
Sponsored in part by the European Community and Bundesanstalt fuer Strassenwesen
Avail: NTIS HC A21/MF A01

Eleven dynamic fronto-occipital impact tests on helmet-protected cadavers were conducted with a deceleration trolley to which a quasi-rigid wall was installed. Effective head impact velocity lay between 32 and 45 km/h. The maximum deceleration of the head was on average 136 g in x-direction and 105 g in z-direction. The deceleration of the vertebral column reached values of 146 g for the 1st thoracic vertebra and 77 g for the 12th thoracic vertebra (average value of the maxima). Examination of the vertebral column showed 6 cases of severe compression fractures of the upper and middle thoracic part; signs of strain and flexion could be detected in the form of minor injuries in all cases. Discrete skull injuries were detected in only two cases. Injury to the brain could not be found but cannot be excluded in view of the test object. All the full-faced safety helmets used were of the same type and manufacture. The polycarbonate outer shell did not break in any of the tests. The polystyrol inner liner

showed plastic compressions of a maximum of 30% of the thickness of the damping liner at contact point. Author

N83-19425# Biokinetics and Associates Ltd., Ottawa (Ontario). Engineering Dept.

TEMPORAL CHARACTERISTICS OF TRANSLATIONAL ACCELERATION IN THE PREDICTION OF HELMETED HEAD INJURY

J. A. NEWMAN In AGARD Impact Injury Caused by Linear Acceleration: 7 p Oct. 1982 refs
Avail: NTIS HC A21/MF A01

The significance of time as a parameter in the prediction of head injury likelihood of severity is examined. It is shown that since the temporal characteristics of the acceleration waveform is simply a reflection of the mechanical characteristics of the headform/helmet assembly it bears only a trivial relation to the input forcing function and thus is generally uncorrelatable to head injury severity. It is concluded therefore that upper limits on translational acceleration alone, though not without certain restrictions, constitutes a sufficient criteria for evaluating helmet performance. The use of a time parameter is shown to be unsupportable and can lead to unnecessarily complex criteria and inferior helmet performance. Author

N83-19427# Wayne State Univ., Detroit, Mich. Center for Bioengineering.

HUMAN CADAVERIC RESPONSE TO SIMULATED HELICOPTER CRASHES

A. I. KING and R. S. LEVINE In AGARD Impact Injury Caused by Linear Acceleration: 8 p Oct. 1982 refs
(Contract F33615-79-C-530)
Avail: NTIS HC A21/MF A01

The use of energy absorbers in crew seats of military helicopters has the potential of minimizing spinal injuries during a crash. The determination of human response during such simulated crashes was attempted using a Black Hawk crew seat. A total of 28 impacts with 10 different cadavers were carried out to determine the injury pattern and the biodynamic response. Head and pelvic accelerations were measured along with sled and seat acceleration. Floor board and belt loads were also monitored. High speed film was taken to obtain head and torso kinematics. The predominant mode of failure was the anterior wedge fracture from T8 to L3. Generally, there was only one fracture per spine. One of the disturbing observations is the rolling of the shoulders within the restraint system resulting in hyperflexion of the thoraco-lumbar spine and anterior wedge fractures. An associated potential problem area is the observed large head excursions which can lead to significant head and neck acceleration injuries. Author

N83-19428# Daimler-Benz A. G., Stuttgart (West Germany). INJURY MECHANISMS IN FRONTAL COLLISIONS INVOLVING GLANCE-OFF

W. REIDELBACH and F. ZEIDLER In AGARD Impact Injury Caused by Linear Acceleration: 4 p Oct. 1982 refs
Avail: NTIS HC A21/MF A01

Among frontal car collisions offset impact collisions are three times more frequent than symmetrical ones. In case of small overlap and high collision speed the colliding vehicles glance-off. The definition and application of the energy equivalent speed helps to evaluate crash severity and to distinguish glance-off from non-glance-off collisions. The investigation of frequency and severity of injuries to belted occupants unveils that in case of glance-off, due to the impact-shock syndrome, the injury risk of lower extremities is increased, the injury risk of remaining body regions is reduced when compared to non-glance-off cases. Author

N83-19429# Pennsylvania Univ., Philadelphia. Dept. of Neurosurgery.

ACCELERATION DAMAGE TO THE BRAIN

T. A. GENNARELLI and L. E. THIBAUT *In* AGARD Impact Injury Caused by Linear Acceleration: 9 p Oct. 1982 refs
 Avail: NTIS HC A21/MF A01

On the basis of 150 primate experiments utilizing controlled head acceleration the authors conclude that a unitary tolerance for head injury is unrealistic. Rather, a series of tolerance criteria exist that define two fundamentally different kinds of mechanically induced intracranial injury vascular and axonal. The mixture of these two injury types is largely determined by the magnitude and the time-history of the loading condition because of differences in the material properties of the vascular and axonal elements. The topographical distribution of the injured elements will be determined by the kinematics of the loading condition because of asymmetries of geometry, anatomy and constitutive behavior of the intracranial contents. In light of these findings the effect of acceleration on the brain is presented for the continuum of diffuse brain injuries and for acute subdural hematoma. Author

N83-19430# Pennsylvania Univ., Philadelphia. Dept. of Bioengineering.

THE DEVELOPMENT OF INTRACRANIAL TISSUE COMPONENT FAILURE CRITERIA AS A CONSEQUENCE OF CONTROLLED INERTIAL LOADING

L. E. THIBAUT and T. A. GENNARELLI *In* AGARD Impact Injury Caused by Linear Acceleration: 10 p Oct. 1982 refs
 Avail: NTIS HC A21/MF A01

Acute subdural hematoma and diffuse axonal injury have been shown to be responsible for the large majority of deaths and/or disabilities associated with head injuries. In order to develop a set of criteria which describe the tolerance of the head to mechanical loading (and thereby gain better insight into methods of protection) it appears that it is necessary to describe, and to understand discretely the behavior of those components which constitute the intracranial contents. Specifically, the behavior of the vascular and neuronal elements under dynamic loading conditions needs to be further elucidated. Physical and animal experimental models conducted in conjunction with isolated tissue studies will then permit us to relate the more macroscopic phenomena, such as the input force-time history or kinematical response of the head, to the variation of the field parameters within the intracranial vault and the concomitant changes in neurophysiology and neurohistology. Author

N83-19431# Association Peugeot-Renault, Rueil-Malmaison (France). Lab. de Physiologie et de Biomechanique.

RESPECTIVE INFLUENCES OF ACCELERATION, JERKS, AND THE AMPLITUDE OF FLEXION OF THE NECK ON THE OCCURRENCE OF CEREBRAL LESIONS [INFLUENCES RESPECTIVES DE L'ACCELERATION, DU JERK ET DE L'AMPLITUDE DE LA FLEXION DU COU SUR LA SURVENUE DES LESIONS CEREBRALES]

C. TARRIERE, G. WALFISCH, A. FAYON, C. GOT, F. GUILLON, A. PATEL, and J. HUREAU (Paris Univ.) *In* AGARD Impact Injury Caused by Linear Acceleration: 23 p Oct. 1982 refs *In* FRENCH Prepared in cooperation with Hopital Raymond Poincare
 Avail: NTIS HC A21/MF A01

Experimental results obtained on fresh human cadavers whose average vascular pressure was reestablished before undergoing direct impacts to the head are summarized. The influences of parameters such as linear and angular acceleration, jerk, the amplitude of neck flexure, and shock duration are analyzed and discussed. Drawings show the principle of the frontal and lateral impact tests and the kinematics of the head during these tests. The severity of the cerebral lesions from lateral and frontal impacts; the location of the lesions from parieto-temporal and frontal impacts; impacts from free falls; and automobile accident reconstruction are considered. Measurements made of the head of a dummy and those made at the center of gravity of the heads

of human subjects under the same test conditions are compared.
 Transl. by A.R.H.

N83-19432# Naval Biodynamics Lab., New Orleans, La.
HEAD AND SPINE INJURIES

A. SANCES, JR., J. MYKLEBUST, C. HOUTERMAN, R. WEBER, J. LEPKOWSKI, J. CUSICK, S. LARSON, C. L. EWING, D. J. THOMAS, B. SALTZBERG (Texas Research Inst. of Mental Sciences) et al. *In* AGARD Impact Injury Caused by Linear Acceleration: 35 p Oct. 1982 refs Prepared in cooperation with the Medical College of Wisconsin
 (Contract N00014-77-C-0749)
 Avail: NTIS HC A21/MF A01

Neurophysiologic and biomechanical methods were used to evaluate axial tension applied to the cervical spinal cord and brain during impact or inertial loading. Because axial forces are often implicated in military accidents, these studies were designed to evaluate physiologic changes in the brain and spinal cord with cervical axial tension applied to the Rhesus (*Macaca mulatta*) monkey. Both slowly applied (0.1 to 1 cm/s) and rapidly applied loads (greater than 100 cm/s) were studied in the isolated fresh cadaveric cervical column of the monkey and in the intact living and dead monkey. Similar investigations were conducted on fresh human cadaveric skulls and cervical spinal columns and in the fresh human cadaveric torso. Both axial tension and compression were applied to the human preparations. Thoraco-lumbar sections were also tested for failure in compression. Helmet studies were also conducted to determine the effects with axial loading. A mathematical model was developed using a lumped parameter torso, head and helmet capable of simulating displacement and time dependent applied loads. The model was compared with photographically studied football injuries for validation. Author

N83-19433# Naval Biodynamics Lab., New Orleans, La.
 Neurophysiology Div.

NEUROPHYSIOLOGICAL EFFECTS OF -X IMPACT ACCELERATION

M. S. WEISS and M. D. BERGER *In* AGARD Impact Injury Caused by Linear Acceleration: 7 p Oct. 1982 refs
 Avail: NTIS HC A21/MF A01

In 19 experiments, eight unanesthetized Rhesus monkeys, with torsos restrained in a seated position, and with head and neck free to move were subjected to peak sled accelerations in the -X direction ranging from 42 m/sq sec to 963 m/sq sec. Recordings of cortical somatosensory evoked potentials were made using recording electrodes chronically implanted over the somatosensory cortex. Electrical pulse stimuli were delivered at a rate of 5 Hz through spinal electrodes located at L1 - L2. Evoked potentials were recorded prior to impact, through the impact event, and subsequent to impact, then subjected to quantitative analysis procedures which included normalized cross-correlation and exponential regression. The results of this analysis suggest a neurophysiological effect which holds promise as an indicator of a pre-injurious central nervous system condition. This effect is an immediate increase of 2% to 5% in the latency of the primary surface positive peak of the cortical evoked potential. There appears to be a threshold for these increases in latency at peak sled accelerations in the region of 600 m/sq. sec. This is consistent with previous findings and provides the basis for applying these techniques to human volunteer experiments. Author

N83-19435# Naval Biodynamics Lab., New Orleans, La.
EVOKED POTENTIAL STUDIES OF CENTRAL NERVOUS SYSTEM INJURY DUE TO IMPACT ACCELERATION

B. SALTZBERG, W. D. BURTON, JR., N. R. BURCH, C. L. EWING, D. J. THOMAS, M. S. WEISS, M. D. BERGER, A. SANCES, JR., P. R. WALSH, J. MYKLEBUST et al. *In* AGARD Impact Injury Caused by Linear Acceleration: 11 p Oct. 1982 Prepared in cooperation with the Medical Coll. of Wisconsin and the Houston State Psychiatric Inst.

(Contract N00014-76-C-0911)

Avail: NTIS HC A21/MF A01

One aspect of a comprehensive program designed to investigate the effects of various levels of impact acceleration on the functional integrity of the nervous system is reported. The results described are based on the measurement of afferent neural transmission in the Rhesus monkey as revealed by latency and amplitude changes in the evoked potential (EP). In order to track the time course of recovery of latency and amplitude with high time resolution, automated methods for detecting peak amplitude and latency of components of the evoked potential were developed. These methods were applied to EP data recorded during impact experiments on Rhesus monkeys. Author

N83-19446# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

VALIDATION OF A BIODYNAMIC INJURY PREDICTION MODEL OF THE HEAD-SPINE SYSTEM

E. PRIVITZER, R. R. HOSEY (Systems Research Lab., Inc., Dayton, Ohio), and J. E. RYERSON (Systems Research Lab., Inc., Dayton, Ohio) *In* AGARD Impact Injury Caused by Linear Acceleration: 10 p Oct. 1982 refs

Avail: NTIS HC A21/MF A01

Mathematical models of the human and baboon head-spine structures are discussed. These models consist of fully three dimensional assemblages of rigid bodies and deformable elements, for which the equations of motion are solved using a large displacement, small deformation dynamic matrix structural analysis program. A validation program for these models is outlined with particular emphasis on the refinement and validation of the baboon head-spine model. Results are described from a series of drop test simulations which were run to study the effects of variations in the degree of spinal curvature on head-spine system dynamic response. Author

N83-19450# Army Safety Center, Fort Rucker, Ala. Directorate for Aviation System Management.

ANALYSIS OF US ARMY AVIATION MISHAP INJURY PATTERNS

J. E. HICKS, B. H. ADAMS, and D. F. SHANAHAN (Army Aeromedical Research Lab.) *In* AGARD Impact Injury Caused by Linear Acceleration: 12 p Oct. 1982 refs

Avail: NTIS HC A21/MF A01

Recent advances in US Army procedures for the identification and reporting of personnel injuries resulting from aircraft mishaps are reviewed. Mishap injury data requirements based on the needs of retrospective and prospective analyses are discussed. The requirements for these analyses to support engineering management decisions that will implement remedial programs to correct identified crashworthiness deficiencies is discussed. The US Army process for gathering aviation mishap injury data is summarized and modifications to procedures and codes for recording injury data are given. Examples of use of the data resulting in fleet wide improvement programs are discussed. R.J.F.

N83-19453# Belgian Air Force, Brussels. Service d'Equetes d'Accidents Aeriens.

TRAUMAS BY IMPACT DURING AIR SERVICE AND FLIGHT FITNESS IN THE BELGIAN AIR FORCE [TRAUMATISMES PAR IMPACT EN SERVICE AERIEN ET APTITUDE AU VOL A LA FORCE AERIENNE BELGE]

A. FLION *In* AGARD Impact Injury Caused by Linear Acceleration: 11 p Oct. 1982 *In* FRENCH

Avail: NTIS HC A21/MF A01

Different impact accidents involving chase pilots over a 10 yr period (1968 through 1977) were analyzed according to the type of impact (landing and takeoff accidents, midair collisions, bird strikes, ejections). In each of these categories, the incidence of type of clothing, the degree of severity of the injuries sustained by the pilot, the relation between the injuries and the circumstances of the accident, and the exact cause of the lesions were determined. The effects of these accidents on the flight fitness of the pilots involved (temporary total unfitness, limited fitness, and final fitness) were also examined. What became of the pilots in the groups of traumatic impacts is discussed. A.R.H.

N83-19454# Institute of Aviation Medicine, Oslo (Norway).
IMPACT INJURIES FROM LINEAR ACCELERATION SUSTAINED BY AN F-5 MAN/MACHINE COLLIDING WITH THE TERRAIN AT 45 KIAS

H. T. ANDERSEN *In* AGARD Impact Injury Caused by Linear Acceleration: 13 p Oct. 1982

Avail: NTIS HC A21/MF A01

An accident is given of the impact injuries sustained by a pilot who flew an F-5 aircraft into the terrain during horizontal flight after having passed the target. An autopsy report is given. R.J.F.

N83-19455*# Arizona Univ., Tucson. Dept. of Biochemistry.
MUSCLE CONTRACTIBILITY AND PROTEIN TURNOVER Final Technical Report, 15 Jun. 1982 - 28 Feb. 1983

M. E. TISCHLER 1983 3 p refs Presented at Muscle Symp., Tucson, Ariz., 11-12 Feb. 1983

(Contract NAGW-357)

(NASA-CR-169970; NAS 1.26:169970) Avail: NTIS HC A02/MF A01 CSCL 06P

Skeletal, cardiac, and smooth muscle contraction, protein turnover and other research are reported. Author

N83-19456*# Tufts Univ., Boston, Mass. Dept. of Anatomy and Cellular Biology.

CONTROL OF BONE REMODELLING BY APPLIED DYNAMIC LOADS Semiannual Report, Sep. 1982 - Mar. 1983

L. E. LANYON and C. T. RUBIN 1983 18 p refs

(Contract NAG9-25)

(NASA-CR-169971; NAS 1.26:169971; SAR-1) Avail: NTIS HC A02/MF A01 CSCL 06P

The remodeling in a functionally isolated in vivo bone preparation is dated to the characteristics of the mechanical regime to which that bone is artificially subjected. Author

N83-19457# Pacific Northwest Lab., Richland, Wash.
RADIATION EXPOSURE FOR DOE AND DOE CONTRACTOR EMPLOYEES, 1980 Annual Report

Feb. 1982 65 p

(Contract DE-AC06-76RL-01830)

(DE82-008252; DOE/EP-0040; AR-13) Avail: NTIS HC A04/MF A01

A total of 85,465 DOE and DOE contractor employees were monitored for whole-body ionizing radiation exposures in 1980. This represents 62.1% of all DOE and DOE contractor employees and is a decrease from the number of individuals monitored in 1979. In addition to the employees 87,590 visitors were monitored. Of all employees monitored, 52.72% received a dose equivalent that was less than measurable, 45.51% a measurable exposure less than 1 rem, and 1.77% an exposure greater than 1 rem. The exposure received by 87.96% of the visitors to DOE facilities was less than measurable. Only 12.03% of the visitors received a

measurable exposure less than 1 rem, and 0.01% of the visitors received an exposure greater than 1 rem. No employees or visitors received a dose equivalent greater than 4 rem. The collective dose equivalent for DOE and DOE contractor employees was 7405 person-rem. The collective dose equivalent for visitors was 619 person-rem. The total dose equivalent for employees and visitors combined was 8024 person-rem. DOE

N83-19458# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

ANALYSIS OF PERSONAL THERMAL CONTROL SYSTEM (PTCS) ON HEAD-SPINE STRUCTURE EJECTION DYNAMICS

E. PRIVITZER, C. D. CARROLL, and I. KALEPS Oct. 1982 15 p refs

(Contract AF PROJ. 7231)

(AD-A121155; AFAMRL-TR-82-36) Avail: NTIS HC A02/MF A01 CSCL 06Q

Head-Spine Model (HMS) ejection simulations have been conducted for the purpose of determining what effects a personal Thermal Control system (PSTCS) Headliner Vest will have on occupant dynamic response during ejection. Only the inertial effects of the headliner and vest were considered. Three simulations were run: without any inertial loading of the headliner and vest; and with inertial effects included for two possible vest locations. The prescribed acceleration profile used in the simulations approximated the first 250 msec of a severe H7 seat (used in some F-4 aircraft) acceleration profile. Results demonstrated that the PTCS had negligible effects on the dynamic response and injury potential of the head-spine system. GRA

N83-19459# Pacific Northwest Lab., Richland, Wash.
RADIATION EXPOSURE FOR DOE AND DOE CONTRACTOR EMPLOYEES, 1979

Feb. 1982 64 p

(Contract DE-AC06-76RL-01830)

(DE82-008253; DOE/EP-0039; AR-12) Avail: NTIS HC A04/MF A01

This report is a summary of the data submitted by DOE and DOE contractors for 1979 for 104,986 employees, representing 81% of all DOE and DOE contractor employees. Of all employees monitored, 47.6% received a dose equivalent that was less than measurable, 50.8% a measurable exposure less than 1 rem, and 1.6% an exposure greater than 1 rem. Only three DOE contractor employees at three separate facilities received whole-body dose equivalents greater than 5 rem during 1979. The two reported cases of internal depositions were both less than the annual dose-equivalent standard and resulted from accidental exposures. DOE

N83-19460# California Univ., Los Angeles. School of Dentistry and Dental Research Inst.

HIGH-YIELD CRITERIA FOR PANORAMIC RADIOGRAPHY Final Report

S. C. WHITE and A. B. FORSYTHE Jun. 1982 47 p refs

(Contract PHS-FD-01036)

(PB82-229543; DHHS/PUB-FDA-82-8186; FDA/BRH-81-75)

Avail: NTIS HC A03/MF A01 CSCL 06E

The development of high yield criteria for the use of panoramic radiographs in the treatment planning of patients seeking dental care was studied. Clinicians were asked what signs or symptoms caused them to order a panoramic radiograph upon patient admission into a dental clinic. At the time the patient was radiographed, a variety of demographic and clinical measures were recorded. The most important high yield criterion for the panoramic examination is whether the radiograph is ordered for general screening examination for any specific examination. The use of these decision rules requires clinical judgment of the costs of a missed positive finding relative to that of an unproductive examination. GRA

N83-19461# Danish Welding Inst., Glostrup.

FIBROGENIC POTENTIAL OF WELDING FUMES

R. M. STERN, G. H. PIGOTT (ICI Pic. Central Toxicology Lab.), and J. L. ABRAHAM (California Univ., San Diego) 1982 51 p refs

(PB82-233982; ISBN-87-87806-60-6) Avail: NTIS HC A04/MF A01 CSCL 06T

A search of 3600 indexed pathology cases has disclosed pulmonary fibrosis in twenty nine welders. Scanning electron microscopy of biopsy material reveals macrophages laden with inorganic particulates which have characteristics compatible with welding aerosols. In order to establish a possible relationship between fibrotic reaction and welding fume exposure, the fibrogenic potential of some eleven different welding fumes and metallic aerosols, considered to be reference standard surrogate for the commonly used welding technologies and applications responsible for 70% of welders exposure, is screened using the Rat Peritoneal Macrophage in vitro bioassay. Author (GRA)

N83-19462# Environmental Protection Agency, Research Triangle Park, N.C. Health Effects Research Lab.

DIESEL EMISSIONS SYMPOSIUM PROCEEDINGS

Jul. 1982 647 p refs Symp. held in Raleigh, N.C., Oct. 1981

(PB82-244013; EPA-600/9-72-014) Avail: NTIS HC A99/MF

A01 CSCL 06T

The following subject areas relating to diesel emissions are discussed: diesel emissions characterization and control technology; chemical and bioassay characterization; pulmonary function, toxicology, and biochemistry; mutagenesis; carcinogenesis; exposure, and risk assessment. Author (GRA)

N83-19463# Danish Welding Inst., Glostrup.

INTERLABORATORY COMPARISON OF CR(VI) ANALYSIS OF WELDING FUMES, PRELIMINARY REPORT, COMMISSION 8, IIW

R. M. STERN and E. TOMSEN (Technological Inst.) 1982 72 p refs

(PB82-233990; ISBN-87-8706-76-2) Avail: NTIS HC A04/MF

A01 CSCL 06J

It was decided to perform an interlaboratory study of chromium analysis of welding fumes with the purpose of comparing the results of current analytical techniques, as practiced in the participating laboratories, with each other, and against a proposed standard method for analysis of Cr(VI), which is presented herein. The current analytical techniques used in the participating laboratories, as well as a preliminary discussion of the results of the several analysis for Total Iron, Total Chromium, Water Soluble Cr(VI) and Total Cr(VI), as found in two samples of MIG/SS welding fumes, one of which was spiked with a known amount of water soluble Cr(VI), are described. Author (GRA)

N83-20533* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 238)

Nov. 1982 166 p

(NASA-SP-7011; NAS 1.21:7011(238)) Avail: NTIS HC \$7.00

CSCL 06E

This bibliography lists 583 reports, articles and other documents introduced into the NASA scientific and technical information system in October 1982. Author

N83-20534*# State Univ. of New York, Buffalo. Div. of Cell and Molecular Sciences.

IMMOBILIZATION/REMOBILIZATION AND THE REGULATION OF MUSCLE MASS Status Report, 1 Nov. 1982 - 1 Apr. 1983

R. R. ALMON 1 Apr. 1983 4 p

(Contract NAG2-211)

(NASA-CR-169995; NAS 1.26:169995) Avail: NTIS HC A02/MF

A01 CSCL 06P

The relationship between animal body weight and the wet and dry weights of the soleus and EDL muscles was derived. Procedures were examined for tissue homogenization, fractionation,

protein determination and DNA determination. A sequence of procedures and buffers were developed to carry out all analyses on one small muscle. This would yield a considerable increase in analytical strength associated with paired statistics. The proposed casting procedure which was to be used for immobilization was reexamined. Author

N83-20535# Naval Submarine Medical Research Lab., Groton, Conn.

BIOCHEMICAL COMPARISONS OF TWO-HOUR EXPOSURES TO HYDROGEN-OXYGEN, HELIUM-OXYGEN AND NITROGEN-OXYGEN ATMOSPHERES AT 200 FSWG Interim Report

D. V. TAPPAN, E. HEYDER, M. J. JACEY, and R. O. MADDEN
23 Sep. 1982 17 p refs
(AD-A121536; NSMRL-829) Avail: NTIS HC A02/MF A01
CSCL 06S

Biochemical and hematologic analyses were performed on urine blood samples collected from three civilian divers following exposure for 120 minutes to hydrogen-oxygen, helium-oxygen and nitrogen-oxygen breathing mixtures at simulated pressures of 200 feet of sea water (FSWG). Normoxic environments were maintained except when symptoms of hypoxia, which developed in the subjects breathing nitrogen-containing mixtures, were relieved by additional oxygen. Biological sampling was possible from selected dives during a series of two dives by each subject in each of the gaseous mixtures. An overall evaluation of the biochemical and hematologic signs of stress point to no greater or somewhat reduced stress in divers breathing hydrogen-oxygen compared to helium-oxygen mixtures. Greatest differences were noted during the earlier phases of recovery from the dives. Measurable biological changes as a result of nitrogen-oxygen diving were confounded by outward signs of distress such as nausea and increased frequency of decompression sickness. Biochemical data lend support to the general medical observation of biological safety of hydrogen-oxygen mixtures under the conditions tested. The potential advantage of decreased density and greater availability of hydrogen compared to helium indicate that further testing of hydrogen-containing atmospheres is warranted. GRA

N83-20536# Management and Technical Services Co., Houston, Tex.

MATHEMATICAL MODELS OF PHYSIOLOGICAL SYSTEMS Final Report, 22 Oct. 1980 - 1 Dec. 1982

R. J. WHITE 1 Dec. 1982 90 p refs
(Contract NAS9-16328)
(NASA-CR-167821; NAS 1.26:167821) Avail: NTIS HC A05/MF A01 CSCL 06P

Calcium/musculoskeletal, cardiovascular, erythropoieses, and fluid and electrolyte/renal regulation are discussed. Modeling and software development are also discussed. Author

N83-20537# Committee on Science and Technology (U. S. House).

HEALTH INFORMATION SYSTEMS

J. BORTNICK and K. BOGEN Washington GPO 1983 27 p
Presented to the Subcomm. on Sci., Res. and Technol. and the Subcomm. on Natural Resources, Agr. Res. and Environ. of the Comm. on Sci. and Technol., 97th Congr., 2d Sess., Dec. 1982
Prepared by the Library of Congr., Congr. Res. Serv.
(GPO-12-973) Avail: US Capitol, House Document Room

The utility of health information systems, elements necessary for a useful coordinated health information system (CHIS), problems of existing health data collection activities, problems associated with implementing a CHIS, and possible approaches to a CHIS are discussed. Author

N83-20538*# Wisconsin Univ., Madison. Bone Mineral Lab.
SKELETAL AND BODY COMPOSITION EVALUATION Final Report

R. B. MAZESS Mar. 1983 86 p refs
(Contract NAG2-166; NGR-50-002-051)
(NASA-CR-166465; NAS 1.26:166465) Avail: NTIS HC A05/MF A01 CSCL 06P

Research on radiation detectors for absorptiometry; analysis of errors affecting single photon absorptiometry and development of instrumentation; analysis of errors affecting dual photon absorptiometry and development of instrumentation; comparison of skeletal measurements with other techniques; cooperation with NASA projects for skeletal evaluation in spaceflight (Experiment MO-78) and in laboratory studies with immobilized animals; studies of postmenopausal osteoporosis; organization of scientific meetings and workshops on absorptiometric measurement; and development of instrumentation for measurement of fluid shifts in the human body were performed. Instrumentation was developed that allows accurate and precise (2% error) measurements of mineral content in compact and trabecular bone and of the total skeleton. Instrumentation was also developed to measure fluid shifts in the extremities. Radiation exposure with those procedures is low (2-10 MREM). One hundred seventy three technical reports and one hundred and four published papers of studies from the University of Wisconsin Bone Mineral Lab are listed. B.G.

N83-20539*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ION BEAM SPUTTER ETCHED VENTRICULAR CATHETER FOR HYDROCEPHALUS SHUNT Patent Application

B. A. BANKS, inventor (to NASA) 24 Nov. 1982 13 p
(NASA-CASE-LEW-13107-2; US-PATENT-APPL-SN-444124)
Avail: NTIS HC A02/MF A01 CSCL 06B

An improved cerebrospinal fluid shunt in the form of a ventricular catheter for controlling the condition of hydrocephalus by relieving the excessive cerebrospinal fluid pressure is described. Method for fabricating the catheter and shunting the cerebral fluid from the cerebral ventricles to other areas of the body was improved. The obstruction of cerebrospinal fluid flow pathways or its inadequate absorption via the arachnoid villi into the venous blood of the brain results in hydrocephalus. Surgical correction involves pressure controlled shunting of the cerebrospinal fluid. The shunt will fail to function if the inlet ventricular catheter apertures become blocked. Shunt flow failure also occurs if the ventricle collapses due to improper valve function causing over drainage. The ventricular catheter comprises a multiplicity of inlet microtubules. NASA

N83-20540# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

METHOD FOR THE QUANTITATIVE DETERMINATION OF THE MINERAL SALT CONTENT OF BONES USING RADIOACTIVE ISOTOPES

J. RASSOW and H. STRUTER 22 Oct. 1982 6 p Transl. into ENGLISH of German Patent no. 2004155 (12 Aug. 1971) p 1-8
(AD-A122018; FTD-ID(RS)T-1372-82) Avail: NTIS HC A02/MF A01 CSCL 07B

A method for the quantitative determination of the mineral salt content of bones using radioactive isotopes is described. Two measurements of radioactive isotope attenuation of different photon energies are outlined. GRA

N83-20541# National Academy of Sciences - National Research Council, Washington, D. C. AD Hoc Committee on Polar Biomedical Research.

POLAR BIOMEDICAL RESEARCH, AN ASSESSMENT. APPENDIX: POLAR MEDICINE, A LITERATURE REVIEW Final Report, Nov. 1980 - Sep. 1982

F. C. KOERNER Oct. 1982 94 p refs
(Contract DAMD17-81-C-1012; DA PROJ. 3M1-61102-BS-10)
(AD-A120696) Avail: NTIS HC A05/MF A01 CSCL 06E

The study on polar biomedical research was undertaken by the Ad Hoc Committee on Polar Biomedical Research. Its objectives

were to examine and summarize current knowledge of the medical aspects of life in polar regions and to consider research needs in relation to the expected increase in human populations in these areas as a result of growing economic, scientific, and military activities. This Appendix to the report of the Committee reviews the current level of understanding in polar biomedicine, lists more than 700 references, and provides background for the discussion, conclusions, and recommendations in the Committee's report. The Committee believes that it will be a useful resource for administrators, researchers, providers of health care services, and others concerned with human health in polar regions.

Author (GRA)

N83-20542# School of Aerospace Medicine, Brooks AFB, Tex. SOME BIOCHEMICAL INDICES OF MILD PHYSICAL STRESS: A PRELIMINARY STUDY Final Report, Oct. 1980 - May 1981

J. P. ELLIS, JR., D. C. READER, J. R. FISCHER, JR., and D. F. WEASE Sep. 1982 12 p refs
(Contract AF PROJ. 7930)
(AD-A120708; SA-TR-82-33) Avail: NTIS HC A02/MF A01 CSCL 06S

Toward establishing an analytical capability for quantifying the physical demands of job stress, the effectiveness of an experimental protocol was ascertained in a group of healthy men. The protocol featured measurement of epinephrine (E), norepinephrine (NE), and cortisol in blood drawn moments before and after 3 discrete levels of treadmill exercise. An added feature was testing of subjects with differing degrees of physical fitness (as adjudged by exercise habits). Although ways of enhancing the protocol's effectiveness were identified, the following definitive findings emerged: (1) plasma NE concentrations were the most sensitive to workload and differentiated fitness subgroups, (2) plasma E levels were slightly less sensitive to workload and did not differentiate as well fitness subgroups, and (3) evidence of adrenocortical stimulation was found only at the highest exercise level, and only for the less fit subjects. Exercise-induced changes in plasma NE correlated well ($r=0.861$) with concomitant changes in blood lactate (reported elsewhere), suggesting the 2 indices might collectively distinguish physical from cognitive or emotional demands in various work environs.

GRA

N83-20543# Purdue Univ., Lafayette, Ind. School of Electrical Engineering. NEW TECHNIQUES FOR MEASURING SINGLE EVEN RELATED BRAIN POTENTIALS Interim Report, 1 Apr. 1981 - 30 Mar. 1982

C. D. MCGILLEM and J. I. AUNON 1 Sep. 1982 16 p
(Contract AF-AFOSR-0152-80; AF PROJ. 2313)
(AD-A120474; AFORS-82-0901TR) Avail: NTIS HC A02/MF A01 CSCL 06P

Alternative methods of selecting features of visual evoked potentials for automatic pattern classification are compared. Forward sequential feature selection with linear and quadratic discriminant functions, step-wise linear discriminant analysis and exhaustive enumeration with a linear discriminant function are considered. It is found that exhaustive enumeration provides a moderate improvement over the other procedures. In many cases the optimum set of features selected for a given size set does not contain the same features that were found optimum in a set having a different number of features. A new class of filters has been developed for processing evoked potentials that provides much greater discrimination against the ongoing EEG than other filters that have been employed. The filter incorporates all deterministic and statistical information about the signal and noise into a matrix operator that processes the measured data vector. Typical results are shown. A study of the effects of the ongoing EEG on measurement of the latency of evoked potential components is described. The results of the study indicate that the majority of the latency variations found experimentally are intrinsic to the evoked potentials themselves and do not result from interference by the ongoing EEG.

GRA

N83-20544# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.

MODELING OF HUMAN JOINT STRUCTURES Final Report, Jan. 1978 - Jun. 1981

A. E. ENGIN and M. H. MOEINZADEH Wright-Patterson AFB, Ohio AFAMRL Sep. 1982 180 p refs
(Contract F33615-78-C-0510; AF PROJ. 2312)
(AD-A121076; AFAMRL-TR-81-117) Avail: NTIS HC A09/MF A01 CSCL 06S

Dynamic simulation of the response of the total human body to external forces provides essential information for prediction of injury and subsequent design and development of crash protection systems. The research program presented in this report is concerned with mathematical modeling of an articulating joint defined by the joint contact surfaces of two body segments and the joint ligaments. A rather extended discussion of the articulations and anatomical descriptions of the elbow, shoulder, hip, knee and ankle joints are first presented, with special emphasis on the location and functional aspects of the major ligaments of each joint. This is followed by a description of the articulating surfaces and the development of a measurement technique for the determination of articulating surface equations for the elbow, hip, knee and ankle joints. Next, a constitutive equation representing ligament characteristics and behavior is presented and the attachment sites of the ligaments of the elbow, hip, knee and ankle joints are provided. General two and three dimensional mathematical dynamic models of an articulating joint are then developed to determine the nature of motions and forces between two body segments. The results are compared with experimental data from the literature and the validity of the model is established.

GRA

N83-20545# Mason (Virginia) Research Center, Seattle, Wash. DIFFERENCES IN TRANSIENT AND STEADY STATE ISOBARIC COUNTERDIFFUSION Final Report, 1 Sep. 1978 - 30 Aug. 1981

B. G. DAOUST, R. WHITE, H. SWANSON, R. DUNFORD, and J. MAHONEY 19 Jul. 1982 65 p refs
(Contract N00014-78-C-0749)
(AD-A121315) Avail: NTIS HC A04/MF A01 CSCL 06S

Recent studies demonstrated the interpretive difficulty associated with decompression experiments and the advantages associated with isobaric experiments involving either transient or steady-state counter-techniques. A very pronounced periodicity in numbers of bubbles with time following a gas switch which is as yet unexplained but may be most easily accounted for on the basis of periodic blood flow changes linked with other natural cycles. Periods appear to range in time from 40-90 minutes, and may be due to simple factors such as bubbles building up and sticking in areas of sluggish venous flow and then being released over a period of several minutes. Finally, perspectives for future work in this area are very encouraging in that our results confirmed and extended our previous work and have suggested that combined experiments where a given area of skin is masked with an ability to pass helium over it and combined with breathing a more soluble gas (such as nitrous oxide) to produce central venous bubbles.

Author

N83-20546# Undersea Medical Society, Bethesda, Md. MAN IN THE COLD ENVIRONMENT. A BIBLIOGRAPHY WITH INFORMATIVE ABSTRACTS. UPDATED VERSION

C. W. SHILLING, P. STORY, E. PODOLAK, and C. ROGERS 1 Sep. 1982 366 p
(Contract N00014-82-K-0180)
(AD-A121441; UMS-PUB-57(CE-3)) Avail: NTIS HC A16/MF A01 CSCL 06E

The scope of the literature search was directed toward military applications, particularly those dealing with cold injury, adaptation, therapeutic drugs, and rewarming techniques. Clinical and laboratory findings and applicable case histories dealing with the subject of hypothermia in general are included because of their pertinency to the understanding of the problems in treating hypothermic victims.

GRA

52 AEROSPACE MEDICINE

N83-20547# Aerospace Medical Div., Brooks AFB, Tex. Plans Div.

AIR FORCE TECHNICAL OBJECTIVE DOCUMENT, AEROSPACE MEDICAL DIVISION, FISCAL YEAR 1984 Final Report

D. C. BEATTY and L. H. SHINGLER Dec. 1982 46 p
(AD-A122696; AMD-TR-82-1; AMD-TR-81-1) Avail: NTIS HC A03/MF A01 CSCL 06T

This TOD describes the planning methodology used within AMD laboratories' eight technology areas to achieve our technical goals. Specifically, efforts are directed in the biotechnology program to man's adaptability, survivability, and performance capabilities within his operational environment. This research and development of AMD's functions is accomplished as disciplinary work by teams of biomedical scientists, engineers and physical scientists within the Air Force laboratories and the industrial and academic research and development communities. Author (GRA)

N83-20548# Oak Ridge National Lab., Tenn.

NUCLEAR MEDICINE TECHNOLOGY Progress Report, quarter ending 30 Sep. 1981

F. F. KNAPP, JR. Feb. 1982 24 p refs
(Contract W-7405-ENG-48)

(DE82-011300; ORNL/TM-8123) Avail: NTIS HC A02/MF A01

A new tellurium fatty acid analog, 15-penyl-6/sup 123m/Tetellurapentadecanoic acid, was synthesized and evaluated to determine the effect of the terminal phenyl group on myocardial uptake in rats. This new agent shows rapid and pronounced myocardial uptake and unique myocardial retention. The goal of these studies is the development of a tellurium fatty acid labeled with iodine-123 that would be useful to evaluate regional fatty acid metabolism. The /sup 123m/Te-labeled telluraheptadecanoic acid (THDA) analogs 12-THDA and 13-THDA were prepared and evaluated in rats. Both of these analogs show lower heart uptake and significantly decreased heart:blood and heart:lung ratios than the parent compound, 9-THDA. A re-evaluation of 11-/sup 123m/Te-THDA indicated that this analog showed significant myocardial uptake analogous to 9-THDA. These results indicate that tellurium in position-12 or -13 of THDA has a special effect on the mechanism of myocardial uptake. DOE

N83-20549# Bureau of Radiological Health, Rockville, Md.
AN OVERVIEW OF ULTRASOUND: THEORY, MEASUREMENT, MEDICAL APPLICATIONS, AND BIOLOGICAL EFFECTS Final Report

H. F. STEWART and M. E. STRATMEYER Jul. 1982 147 p refs
(PB83-111583; DHHS/PUB-FDA-82-8190; FDA/BRH-82-76)
Avail: NTIS HC A07/MF A01 CSCL 06F

Medical ultrasound in the United States is discussed. Background information on characteristics and interaction of ultrasound with matter, measurement of ultrasound fields, and medical applications of ultrasound is given. The potential biological effects of ultrasound in humans and experimental animals and the possible mechanisms for producing these effects are discussed. The potential risk to public health is evaluated and recommendations are made for the safe use of this modality. Recommendations are also made for further research to help clarify the potential biological risk associated with this rapidly growing modality. Author (GRA)

N83-20550# Thermo Electron Corp., Waltham, Mass.
RESEARCH AND DEVELOPMENT SYSTEMS FOR TRANSMITTING ENERGY THROUGH INTACT SKIN Annual Report, Apr. 1981 - Mar. 1982

C. SHERMAN, B. DALY, K. DASSE, W. CLAY, M. SZYCHER, C. BATTERSBY, J. HANDRAHAN, J. SCHUDER, M. LEWIS, and M. WORTHINGTON Apr. 1982 131 p refs Sponsored by National Heart and Lung Inst.
(PB83-109934; TE4285-264-82; NIH-N01-HV-0-2903-2) Avail: NTIS HC A07/MF A01 CSCL 06O

In vivo and in vitro evaluations of the prototype transcutaneous transformer were completed. Based on the results, a second

generation transformer was developed and in vivo testing was begun. GRA

N83-20551# Office of Technology Assessment, Washington, D.C.

STRATEGIES FOR MEDICAL TECHNOLOGY ASSESSMENT

Sep. 1982 230 p refs
(PB83-113274; OTA-H-181) Avail: NTIS HC A11/MF A01 CSCL 06L

The present system of identifying and testing medical technologies and of synthesizing and disseminating assessment information is analyzed. The report focuses on the flow of information that is central to an efficient assessment system. Methods for testing technologies and for synthesizing information are explored, and a compendium of data and bibliographic sources are included. The report also describes the innovation process for medical technologies, the effects that Federal policies have on that process, and the needs those policies generate for technology assessment information. It critiques the current system of assessment and provides policy options, both legislative and oversight, for Congress to improve the system. GRA

53

BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

A83-23370

HUMAN ASPECTS OF INTEGRATED NAVIGATION IN THE AIR

V. D. HOPKIN (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) Journal of Navigation, vol. 36, Jan. 1983, p. 21-27.

In highly automated navigational systems, human intervention in cases of failure may be impossible when the operator does not understand the design and underlying principles of the equipment. Another possibility is that failures may occur and not be reflected in the system displays. It is pointed out that the designers of navigational aids, while of course being aware of the purpose of the aids, have only an imperfect understanding of how the aids are used in practice and what constraints operate during their use. Integrated navigation in the air raises the question of the role to be played by man. He cannot verify many of the computations because they are too complex and he does not have the time. There would seem to be little point in his monitoring what he cannot verify. The functions that man will perform in the future may be far removed from navigation in the traditional sense. C.R.

A83-24864#

HUMAN ASPECTS OF INTEGRATED NAVIGATION IN THE AIR

V. D. HOPKIN (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) In: Integrated navigation: Actual and potential - Sea-air-space; Proceedings of the International Congress, Paris, France, September 21-24, 1982. Volume 2. Paris, Institut Francais de Navigation, 1982, p. BP 4-1-A to BP 4-7-A.

Consideration is given to the human role in an aircraft navigation environment that is becoming increasingly automated. The problem of geographical disorientation when conventional and automated aids are in use is discussed, along with the problems of detection and adequate intervention arising in the event of navigational system failure. Human limitations in perception, understanding, memory, attention and information processing are considered as they influence the design of navigational aids, and the question of the desirable extent of familiarity of the navigational aid designer with the navigation task is addressed. Attention is also given to the design of aids involving pattern matching of continuously generated cockpit displays with visual materials, and to the possible solution of the problem of human limitations by complete reliance

on automated systems. Finally, the training of the future navigator in skills useful in automated navigation, which may not seem like traditional navigation at all, is discussed. A.L.W.

A83-25156

THE RELATION OF THE QUALITY OF INFORMATION PROCESSING WITH THE LEVEL OF THE WORK ACTIVITY OF A HUMAN OPERATOR [O SVIAZI KACHESTVA PERERABOTKI INFORMATSII S UROVNEM PROFESSIONAL'NOI DEIATEL'NOSTI CHELOVEKA-OPERATORA]

N. V. MAKARENKO (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal, vol. 29, Jan.-Feb. 1983, p. 74-78. In Russian. refs

The work capacity and fitness of test pilots and civil aviation pilots were tested on a device (the PPCh-2) designed to deliver precisely-dosed psychophysiological loads of various complexities followed by the measurement of the subject's responses. Results show a high correlation between indices of the information processing speed and the quality of the work performed, as well as between the work fitness and the quality of the work performed. It is concluded that the work capacity and fitness indices can be effectively utilized as important psychophysiological criteria for the selection of operators engaged in the control of complex moving automatic systems. N.B.

A83-25665

NEUROPSYCHOLOGICAL FUNCTIONING AFTER PROLONGED HIGH ALTITUDE EXPOSURE IN MOUNTAINEERING

C. F. CLARK, R. K. HEATON, and A. N. WIENS (Colorado, University, Denver, CO; Oregon Health Sciences University, OR) Aviation, Space, and Environmental Medicine, vol. 54, Mar. 1983, p. 202-207. refs

This prospective study examined the possibility of long lasting CNS sequelae of high altitude exposure in mountaineering. An extensive battery of neuropsychological and personality tests was given to 22 subjects before and after Himalayan climbs above 5334 m (17,500 ft). All subjects were at altitude for long periods with supplemental oxygen, but did not suffer other physical insults such as serious injury or food or water deprivation. Although several climbers experienced acute effects of mountain sickness while at altitude, their post-climb evaluations revealed no evidence of lasting cerebral dysfunction or psychological deficit. A few climbers' subjective ratings of mental functioning were worse after their expeditions, but these self-assessments were unsupported by their performances on the objective testing. It was concluded that in healthy people who do not suffer other physical insults as well, CNS effects of low oxygen tensions during high altitude climbs are reversible. (Author)

A83-25998*

Virginia Polytechnic Inst. and State Univ., Blacksburg.

EVALUATION OF 20 WORKLOAD MEASURES USING A PSYCHOMOTOR TASK IN A MOVING-BASE AIRCRAFT SIMULATOR

W. W. WIERWILLE and S. A. CONNOR (Virginia Polytechnic Institute and State University, Blacksburg, VA) Human Factors, vol. 25, Feb. 1983, p. 1-16. refs
(Contract NAG2-17)

The sensitivity and intrusion of 20 pilot workload assessment techniques were compared using a psychomotor loading task in a three degree-of-freedom moving-base aircraft simulator. The primary task was an instrument landing system approach and landing, with measures taken between the outer and middle markers. Three levels of psychomotor load were obtained by combined manipulation of random wind-gust disturbance level and pitch stability. Two rating scale measures and one control movement measure demonstrated sensitivity to all levels of load. Additionally, one time estimation measure and one pulse rate measure demonstrated sensitivity to some levels of load. No intrusion was found. The results of this experiment indicate that the sensitivities of workload estimation techniques vary widely, and that only a few techniques appear sensitive to psychomotor load. (Author)

A83-26000

THE EFFECTS OF EXTENDED PRACTICE ON THE EVALUATION OF VISUAL DISPLAY CODES

R. E. CHRIST (U.S. Army, TRADOC Systems Analysis Activity, White Sands Missile Range, NM) and G. M. CORSO (Georgia Institute of Technology, Atlanta, GA) Human Factors, vol. 25, Feb. 1983, p. 71-84. refs
(Contract N00014-76-C-0306)

A series of nine experiments are reported in which highly practiced subjects were used to investigate the use of letters, digits, familiar geometric shapes, and colored dots as coding dimensions in visual displays. These experiments used single-code and dual-code displays in three isolated tasks (choice reaction, search and locate, and identification-memory) and in a multiple task that combined the three tasks in an irregularly alternating sequence. The results of these experiments provided no basis for concluding that any particular code has a general advantage or disadvantage over any other. Furthermore, when there were differences in performance with different codes, there was a tendency for practice to attenuate those differences. It is concluded that the relative effectiveness of different visual codes varies as a function of practice, other display conditions, the tasks, and the dependent measure used to make the comparison. (Author)

A83-26086#

A STUDY ON AIRBORNE INTEGRATED DISPLAY SYSTEM AND HUMAN INFORMATION PROCESSING

K. MIZUMOTO, H. IWAMOTO, S. SHIMIZU, and I. KURODA (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan) Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 23, Sept. 1982, p. 77-88. In Japanese, with abstract in English. refs

The cognitive behavior of pilots was examined in an experiment involving mock-ups of an eight-display electronic attitude direction indicator for an airborne integrated display. Displays were presented in digital, analog-digital, and analog format to experienced pilots. Two tests were run, one involving the speed of memorization in a single exposure and the other comprising two five second exposures spaced 30 sec apart. Errors increased with the speed of memorization. Generally, the analog information was assimilated faster than the digital data, with regard to the response speed. Information processing was quantified as 25 bits for the first five second exposure and 15 bits during the second. D.H.K.

A83-26301

HUMAN FACTORS SOCIETY, ANNUAL MEETING, 25TH, ROCHESTER, NY, OCTOBER 12-16, 1981, PROCEEDINGS

R. C. SUGARMAN, (ED.) (Calspan Corp., Buffalo, NY) Santa Monica, CA, Human Factors Society, 1981. 796 p.

Various topics in human factors research are discussed, including human factors in nuclear power plant safety and operations, aerospace operations, management and organization, occupational environments, job and workplace design, industrial inspection, and the design of the living environment for older Americans. Also examined are visual performance, work physiology and biomechanics, the integration of human factors and industrial design, control room design and evaluation, methods for teaching human factors principles, control design and evaluation, industrial ergonomics in Europe, target acquisition, and information processing and decision making. Other topics considered include medical human factors; approaches and methods in product design; training devices, strategies, and evaluation; testing and research methodologies; computer workplaces and equipment; the subjective assessment of mental workload; psychomotor performance and skill acquisition and retention; and driver behavior and safety. N.B.

A83-26305**SOME PERCEPTUAL EFFECTS OF DIFFERENTIAL LUMINANCE INDUCED BY THE USE OF A MONOCULAR HEAD-UP DISPLAY**

J. QUALY (Boeing Military Airplane Co., Seattle, WA) and S. L. BUCK (Washington, University, Seattle, WA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 64-68. refs

Head-up displays (HUDs) are currently used to present a pilot with a view of the outside world and simultaneously with overlapping instrument-related symbology. Monocular HUDs (MHUDs) have also been developed that present symbology only to one eye. Because not all of the light from the external scene passes through the MHUD, the result is differential illumination between the MHUD and non-MHUD eyes. The literature suggests that under appropriate circumstances differential illumination of the eyes can lead to distortions of depth, size, and direction and velocity of motion. If of sufficient magnitude, these distortions could seriously disrupt pilot performance during low level flight and on approach and landing. The extent to which these possible distortions will actually occur cannot be determined from the existing literature and must be determined empirically. (Author)

A83-26311**A VISUAL CHANNEL THEORY APPROACH TO PILOT PERFORMANCE AND SIMULATOR IMAGERY**

D. REGAN, R. KRUK, K. BEVERLEY (Dalhousie University, Halifax, Nova Scotia, Canada), and T. LONGRIDGE (USAF, Human Resources Laboratory, Williams AFB, AZ) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 223-227. Natural Sciences and Engineering Research Council refs (Contract NSERC-A-0323; AF-AFOSR-78-3711)

The hypothesis that an early stage of visual processing consists of analyzing retinal image information into a number of abstract categories or features, called channels, is reviewed and the implications of this hypothesis for flight simulator visual display design are examined. The results of a study designed to evaluate the relationships between channel sensitivity and flight simulator landing performance are presented. No statistically significant differences in any of the threshold measures were found between the nonflying group and any of the flying groups, although the inphase tracking test distinguished the nonflying group from all flying groups. In addition, it was determined that tracking performance related most closely to low visibility landing performance on the simulator. N.B.

A83-26319**MANDATORY PROCESSING OF THE BACKGROUND IN THE DETECTION OF OBJECTS IN SCENES**

G. J. KLATSKY, R. C. TEITELBAUM, R. J. MEZZANOTTE, and I. BIEDERMAN (New York, State University, Buffalo, NY) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 272-276. refs (Contract MDA903-A-G-0003)

Would the relationships between an object and its real-world setting affect the detectability of that object even when the observer knew what the object was and where it would appear. Mandatory processing of scene backgrounds was investigated using a pre-cue design in which the target object's name and location was supplied to the subject prior to a single 100 msec presentation of a line drawing of a real-world scene. The deleterious effect of violating relationships between the target and background indicated that the processing of the scene background was mandatory and affected the perceptibility of the target rather than the memory of the scene. (Author)

A83-26320**BACKGROUND INFLUENCE ON VISUAL ACCOMMODATION - IMPLICATIONS FOR TARGET ACQUISITION**

R. A. BENEL and D. C. R. BENEL (Essex Corp., Alexandria, VA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 277-281. refs (Contract F49620-77-C-0117)

The accommodation of two groups of six observers each of whom viewed high-contrast checkerboard targets presented at six distances (0.9, 1.8, 3.7, 7.3, 16.6 and 29.3m) against either of two backgrounds (highly textured or textureless) was measured with a laser optometer. Significant differences existed between the accommodative responses at each distance due to backgrounds. Implications for size-distances perception and target detection are discussed. (Author)

A83-26321**SUSTAINED SEARCH - NUMBER OF BACKGROUND CHARACTERS, TARGET TYPE, AND TIME ON WATCH**

L. C. PERCIVAL (Louisville, University, Louisville, KY) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 283-285. Research supported by the University of Louisville. refs

Search for emerging targets was evaluated in discrete trials and in a period of continuous watch. Search time increased with number of background characters (NBC) and was faster for targets added to the display than for those which changed from background characters into targets. The rate of increase with NBC was the same for both target types in discrete trials but not in continuous watch. No vigilance decrement occurred, but the conditions under which one might be expected are described. (Author)

A83-26322**EFFECTS OF BLUR AND NOISE ON DIGITAL IMAGERY INTERPRETABILITY**

J. A. TURPIN (Virginia Polytechnic Institute and State University, Blacksburg, VA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 286-289. refs (Contract 49620-75-C-0055; 49020-80-C-0057)

The results of a study of the effects of physical features of digitally derived imagery on human interpretation performance are reported. Trained photointerpreters (PIs) performed information extraction on aerial photographs degraded by blur and noise. Five of the 15 subjects viewed two scenes at blur levels of 40, 84, and 322 microns. Five scenes were examined with SNRs of 75, 60, 42, 24, and 12, with the SNR defined as the maximum intensity to rms noise ratio. The pictures were 4096 x 4096 point grids, with each pixel covering a 20 microns square aperture. Senior PIs graded the results based on ground truth measurements. A significant performance degradation linked to noise variance was found, and the blur level was proportional to the interpretive errors. It was determined that a NATO-type scale can be used to predict the level of accuracy available from a photograph. Finally, no significant effect was detected to arise from a combination of blur and noise interact. M.S.K.

A83-26326**TRAINING EFFECTIVENESS EVALUATION OF DEVICE 2F117 - OFT FOR CH-46 HELICOPTER**

B. X. VOSS, B. J. MCGUIRE, C. J. THEISEN, and T. B. MALONE (Essex Corp., Orlando, FL) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 421-425. refs

This paper summarizes the project activities accomplished during a twelve month training effectiveness evaluation (TEE) of Device 2F117, the Operational Flight Trainer for the CH-46 Helicopter. The application of the operational flight trainer to squadron training was analyzed in consideration of instructional system requirements. The intent was to assess OFT effectiveness

with minimal interference with established training procedures. A survey of pilots to assess the performance characteristics of the OFT and instructional support materials, an OFT utilization survey, the development of criterion based evaluation procedures, and the results of the evaluation are reported. The paper concludes with discussion of the application of OFTs to helicopter training systems, the development and implementation of criterion referenced performance measurement techniques, and issues related to conducting TEEs in a military training setting. (Author)

A83-26327

A QUALITATIVE METHODOLOGY FOR STUDYING AIR FORCE MAINTENANCE

W. CAMPBELL (USAF, Human Resources Laboratory, Williams AFB, AZ) and A. P. CHENZOFF (Applied Science Associates, Inc., Valencia, PA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 457-461.

This paper describes the methodology being used by the Logistics and Technical Training Division of the Air Force Human Resources Laboratory for defining the issues important to maintenance technicians, their supervisors, and their managers. Statements derived from 2700 open-ended interviews are being categorized and stored on computer disc, together with certain demographic data. The statements are then sorted and summarized by topic category. The results of this study will be used to identify maintenance problems and the appropriate means and organizations for solving them. For some problems, the data will suggest alternate solutions which will need to be evaluated experimentally. For other problems, the solutions will come by applying existing technology. (Author)

A83-26328

PSYCHOMETRIC MEASURES OF TASK DIFFICULTY UNDER VARYING LEVELS OF INFORMATION LOAD

W. R. HELM (U.S. Navy, Naval Air Development Center, Warminster, PA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 518-521.

Aircraft design and integrated systems avionics have altered the role of pilots from that of skilled control operator to one of complex system manager, emphasizing the role of psychomotor control in such cognitive skills as perception, memory, information processing, and decision making. The efficiency of male and female subjects in estimating task difficulty and performance relative to actual task performance has been determined by two experiments. In the first experiment, three groups used three types of scales to rate either task difficulty or task performance on a four-choice discrimination task varied across seven levels of information load. In the second experiment, two groups used either a ratio or category scale to rate task difficulty on each of four tasks: four-choice discrimination, Sternberg target identification, random presentation of the first two tasks, and simultaneous presentation of the first two tasks. No sex differences were noted in either task performance or task rating. O.C.

A83-26329

APPLICATION OF CONJOINT MEASUREMENT TO WORKLOAD SCALE DEVELOPMENT

G. B. REID, C. A. SHINGLEDECKER, and F. T. EGGEMEIER (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 522-526. refs

Practical considerations make subjective opinion one of the most widely used methods to assess mental workload. However, the value of the data obtained by subjective methods is often limited because scales are not standardized and are not based on modern psychometric principles. This paper describes the development and validation of a Subjective Workload Assessment Technique (SWAT) which uses conjoint measurement to construct interval level workload scales from ordinal rankings of combinations of levels on three contributory dimensions. An experiment was

conducted to investigate the construct validity and concurrent validity of the SWAT-1 scale. Recommendations for further development are discussed. (Author)

A83-26330* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

DEFINING THE SUBJECTIVE EXPERIENCE OF WORKLOAD

S. G. HART (NASA, Ames Research Center, Moffett Field, CA), M. E. CHILDRESS (San Jose State University, San Jose, CA), and M. BORTOLUSSI (Tufts University, Medford, MA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 527-531.

Flight scenarios that represent different types and levels of pilot workload are needed in order to conduct research about, and develop measures of, pilot workload. In order to be useful, however, the workload associated with such scenarios and the component tasks must be determined independently. An initial study designed to provide such information was conducted by asking a panel of general aviation pilots to evaluate flight-related tasks for the overall, perceptual, physical, and cognitive workload they impose. These ratings will provide the nucleus for a data base of flight-related primary tasks that have been independently rated for workload to use in workload assessment research. (Author)

A83-26331

THE RELATIONSHIP BETWEEN PROCESSING RESOURCE AND SUBJECTIVE DIMENSIONS OF OPERATOR WORKLOAD

W. L. DERRICK (U.S. Air Force Academy, Colorado Springs, CO) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 532-536. refs

A multiple structure model of processing resources (Wickens, 1980) guided construction of tasks of differential resource demand that were both performed by subjects and rated according to workload similarity. Analysis of performance data generally supported model predictions. Multidimensional scaling analysis of the similarity data produced subjective dimensions of workload that were explained in terms of resource demand and task structure. (Author)

A83-26332

PLANS AND THE STRUCTURE OF TARGET ACQUISITION BEHAVIOR

R. A. MILLER, R. J. JAGACINSKI, R. B. NALAVADE, and W. W. JOHNSON (Ohio State University, Columbus, OH) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 571-575. refs
(Contract AF-AFOSR-78-3697)

Subjects manipulated a position control stick with one hand and a velocity control stick with the other hand in order to capture a moving target displayed on an oscilloscope screen. The two control sticks were additively coupled. In order to understand the coordination of the two control sticks, event-based first-order markov 'activity sequence generators' were constructed for individual subjects. These discrete probabilistic structures are closely related to each subjects's overall plane or general strategy for the capture task. Striking individual differences and strategic errors in performance were revealed. When combined with additional time-conditioned (open-loop) and error-conditioned (closed-loop) details, the activity sequence generators provide a basis for a hierarchic description of this perceptual-motor skill. (Author)

A83-26333

COGNITIVE TASK PERFORMANCE TIME DURING TRACKING
D. M. INGS (Eckankar, Inc., Menlo Park, PA) and J. R. BUCK (Iowa, University, Iowa City, IA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 576-580. refs

This study was a test on the feasibility of creating a synthetic time system for cognitive tasks performing during flying. Four types of cognitive tasks were employed (coding, verifying, calculating, and identifying; each at two levels of complexity). Compensatory tracking was performed at two levels of difficulty where RMS statistics were taken within and between the discrete cognitive tasks. The task types and complexity levels were found to significantly affect the performance time (accounting for about 50% of the time variability) and the tracking accuracy. However tracking accuracy was also affected by other factors. Results of this research support the feasibility of a synthetic time system for the class of tasks. (Author)

A83-26334

PILOT SELECTION - PAST, PRESENT AND FUTURE

R. LOO (Canadian Forces Personnel Applied Research Unit, Toronto, Canada) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 646-648.

The paper provided an overview of pilot selection procedures used in the Canadian Forces. Both current and proposed selection tests were discussed. The current selection system focuses on paper-and-pencil tests and the use of the Singer General Aviation Trainer (GAT 1). Proposed selection testing includes the extension of paper-and-pencil tests to new domains, the automation of GAT 1 testing, and microcomputer-based tests. (Author)

A83-26335

INCORPORATION OF A TEST OF SELECTIVE ATTENTION IN A PILOT SELECTION BATTERY

D. GOPHER (Technion - Israel Institute of Technology, Haifa, Israel) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 649-653.

Incorporation of a dichotic listening test of focused attention in the pilot selection battery of the Israel Air Force was studied using a group of 2000 flight cadets. In this test, subjects are presented with 48 dichotic messages, composed of strings of words and digit names. Subjects are required to detect digit names in one ear, ignore information in the other, and reconsider ear relevance upon indication. Three types of selective listening errors are recorded: omissions, intrusions and switching errors. Flight cadets who completed a two year training program had significantly lower error scores on all attention measures. In addition, these measures had low correlations with all other tests of the pilot selection battery. Attention capabilities appear to an independent new dimension that improves the predictive validity of the present battery. (Author)

A83-26336

SEX DIFFERENCES IN THE TRANSFER OF TRAINING OF BASIC FLIGHT SKILLS

T. M. MCCLOY and J. M. KOONCE (U.S. Air Force Academy, Colorado Springs, CO) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 654-656. refs

Twenty-four Air Force Academy cadets participated in an experiment designed to investigate gender differences in the transfer of training between various basic instrument maneuvers. Half the subjects, six males and six females, first flew a climb, cruise, descend profile and then flew a transfer task profile of right turn, cruise, left turn. The remaining subjects, six males and six females, flew the profiles in the reverse order. The results indicate that gender differences in performance of basic flying skills are probably due to previous differential exposure to similar

type tasks. Males and females transferred previous training equally well to more difficult basic instrument maneuvers. (Author)

A83-26337

AN EXPERIENCE-JUDGEMENT APPROACH TO TACTICAL FLIGHT TRAINING

R. P. MEYER and J. I. LAVESON (Design Plus, St. Louis, MO) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 657-660.

The results of an attempt to quantify the complex requirements of tactical aircraft piloting in order to relate them to visual orientation and a training device for teaching pilot skills are presented. The development of an effective trainer is noted to reside on use of an experience-judgement approach to structuring training events and the training device. Experience is defined as the skill or understanding gained from living through, participating, or practicing in a situation. Judgement is divided into spatial and organizational components. Spatial judgement depends on the pilot's ability to assimilate and react to perceptual cues, and organizational judgement is a synthesis of the learned knowledge and perceived information in order to make decisions in real-life conditions. Cues were considered as sky, horizon, and ground features. An expanded task analysis format was defined for a low-angle bombing run. Visual data summarization and data check, geomorphic considerations, and tactical implications included in the design of displays for simulators are discussed, noting that only real objects convey an ultimate realism. M.S.K.

A83-26338

KINEMATIC AND KINETIC PARAMETERS AS INFORMATION FEEDBACK IN THE ACQUISITION OF MAN-MACHINE SKILLS

K. M. NEWELL and P. A. HANCOCK (Illinois, University, Urbana, IL) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 671-675. refs (Contract NSF DAR-80-16287)

The case is advanced for the presentation of kinematic and kinetic parameters directly related to the response dynamics of the limb(s) engaged in action as a form of information feedback in motor skill acquisition. Although this form of terminal information feedback is probably more potent in actions requiring the constraint of multiple biomechanical degrees of freedom, it is shown that kinematic and kinetic parameters also have an impact on the initial acquisition and subsequent refinement of simple motor skills. The relevance of this approach for skill training in the human factors domain is adumbrated. (Author)

N83-19464# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.

APPROACHES TO MODELLING OF ASSOCIATIVE MAPPINGS

G. HIRZINGER 3 Dec. 1981 55 p refs In GERMAN; ENGLISH summary

(DFVLR-MITT-81-32) Avail: NTIS HC A04/MF A01

It is shown that intelligence as needed when dealing with incomplete information, a usual situation in man's brain, is better explained by associative mappings than by the working principles of todays computers. The modeling of associative mappings is analyzed. The role that neural networks play in generating associative mappings is emphasized. S.L.

N83-19465# Illinois Univ., Urbana-Champaign. Engineering-Psychology Research Lab.
DISPLAY LOCATION OF VERBAL AND SPATIAL MATERIAL: THE JOINT EFFECTS OF TASK-HEMISPHERIC INTEGRITY AND PROCESSING STRATEGY

C. D. WICKENS, D. L. SANDRY, and R. HIGHTOWER Oct. 1982 28 p refs
 (Contract N00014-79-C-0658; NR PROJ. 196-158)
 (AD-A121000; EPL-82-2/ONR-82-2) Avail: NTIS HC A03/MF A01 CSCL 05J

In this experiment 10 subjects controlled a first or second order system while monitoring a visual channel for one or two 3-character alpha-numeric call numbers in a memory search task. In a compatible display configuration the tracking task was displayed to the left visual field and controlled by the left hand. The verbal task was performed on the right. Compatibility was achieved here because the spatial tracking display had direct access to the processing hemisphere, which also directly controls the manual response; a corresponding assignment guides the verbal task. In the incompatible configuration, the two tasks are reversed: tracking to the right, verbal memory to the left. The results of Experiment 1 indicated a strong main effect of compatibility for both tasks. This effect was consistent across all levels of difficulty of both tasks. In Experiment 2 only the most difficult tasks were performed in the two configurations and the emphasis between the two tasks was varied. Compatibility effects were again observed, and were enhanced when the verbal task was emphasized. These results are interpreted in terms of scanning strategies adopted by the subjects. GRA

N83-19466# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
UNDERSTANDING INSTRUCTIONS: THE ROLE OF EXPLANATORY MATERIAL Technical Report, 15 Oct. 1980 - 15 Jul. 1982

E. E. SMITH and L. GOODMAN 31 Jul. 1982 115 p refs
 (Contract N00014-81-C-0019)
 (AD-A119162; BBN-5088; TR-1-ONR) Avail: NTIS HC A06/MF A01 CSCL 05J

This research deals with how people understand, execute, remember, and use written instructions. The issue of major concern is the organization of steps in a set of instructions. Typically, instructional steps are organized linearly, i.e., instructions consist entirely of a sequence of steps to be executed. Theoretical considerations based on text-processing research, however, suggest that performance would be better if instructions also included some higher-level, hierarchically-organized, explanatory material, where such material serves as a rationale for each executable step. To test this, three different sets of instructions for assembling an electrical circuit were composed. In Experiment 1, steps were read faster, executed somewhat more accurately, and recalled more accurately with Structural and Functional instructions than with Linear ones. Experiment 2 replicated the reading-speed and execution-accuracy advantages for the Structural and Functional instructions, and also suggested that Functional instructions might be superior to Structural ones with regard to answering the conceptual-troubleshooting questions about the circuit and reconstructing the circuit. A secondary concern of the research has been with the content of specific steps. Typically, the time needed to read and to execute a step increased with the number of kernel ideas or propositions in the steps. In addition, steps differ in importance (the more important ones involving major components or their interconnections). While importance affects both reading time and recall, it had no effect on execution, the latter being sensitive primarily to manual requirements. GRA

N83-19467# Rutgers - The State Univ., New Brunswick, N. J.
ATTENTION AND DECISION FACTORS IN BIMODAL SIGNAL PROCESSING Interim Scientific Report, 15 Jun. 1981 - 14 Jun. 1982

M. L. SHAW Aug. 1982 9 p refs
 (Contract AF-AFOSR-0215-81; AF PROJ. 2313)
 (AD-A119181; AFOSR-82-0712TR) Avail: NTIS HC A02/MF A01 CSCL 05J

The research to be described is directed toward answering two related questions: (1) how is information from multiple sensory sources combined to reach a binary 'yes-no' detection decision, and (2) does dividing attention among multiple sources cause losses of information. During this first year, efforts have focused on examining information integration and attention allocation with simple unimodal stimuli. Three experiments were run to investigate the first question when sources of information were defined as different hypothetical frequency channels and the stimuli were simple tones. Data from these studies indicated that separate decisions are formed about the presence of a tone in each channel, and these independent decisions are then pooled to arrive at a 'yes-no' response. This independent decisions model was supported both for widely separated tones and for tones differing in frequency by only one tenth of a critical band (e.g., 700 and 715 Hz). With regard to the second research question, a pair of experiments showed that losses of information apparently do not result when the number of hypothetical frequency channels is increased from two to four. This result suggests that attention to pitch is not capacity limited. GRA

N83-19468# California Univ., Los Angeles. Mental Retardation Research Center.

NEURONAL ADAPTIVE MECHANISMS UNDERLYING INTELLIGENT INFORMATION PROCESSING Annual Scientific Report, 1 Dec. 1981 - 30 Mar. 1982

C. D. WOODY 1 May 1982 28 p refs
 (Contract AF-AFOSR-0179-81; AF PROJ. 2312)
 (AD-A119224; AFOSR-82-0723TR) Avail: NTIS HC A03/MF A01 CSCL 05J

Advances made in our research during the past year include (1) determination of effects of cyclic AMP, a neuromodulatory chemical, on neurons of the motor cortex and (2) documentation, by computer analysis, of a 100-fold increase in the rate or acquisition of conditioned learning by adding stimulation of the hypothalamus to the usual associative presentations of CS and US. Author (GRA)

N83-19469# Naval Biodynamics Lab., New Orleans, La.
REPEATED MEASURES ON A CHOICE REACTION TIME TASK
 M. KRAUSE and A. C. BITTNER, JR. Aug. 1982 10 p refs
 (Contract MF58524002)
 (AD-A121904; NBDL-82R006) Avail: NTIS HC A02/MF A01 CSCL 12A

This study investigated a visual choice reaction time task to determine its suitability for repeated measures experimentation. Fifteen men served as subjects for one-, two-, and four-choice reaction time conditions. Fifty trials on each condition were administered for 15 days. Results indicated that across all RT conditions, intersession correlations were differentially stable by about Day 8, with reliabilities around .71. Means and variances remained unchanged over the stable days for the RT measure. It was concluded that studies using RT as the dependent variable should allow for at least 1000 practice trials prior to using RT as a performance assessment tool. Author (GRA)

53 BEHAVIORAL SCIENCES

N83-20552*# Old Dominion Univ., Norfolk, Va.
THE EFFECTIVENESS OF INCORPORATING A REAL-TIME OCULOMETER SYSTEM IN A COMMERCIAL FLIGHT TRAINING PROGRAM Final Report

D. H. JONES, G. D. COATES, and R. H. KIRBY Washington
NASA Mar. 1983 43 p refs
(Contract NCC1-57)
(NASA-CR-3667; NAS 1.26:3667; REPT-82-613) Avail: NTIS
HC A03/MF A01 CSCL 051

The effectiveness of incorporating a real-time oculometer system into a Boeing 737 commercial flight training program was studied. The study combined a specialized oculometer system with sophisticated video equipment that would allow instructor pilots (IPs) to monitor pilot and copilot trainees' instrument scan behavior in real-time, and provide each trainee with video tapes of his/her instrument scanning behavior for each training session. The IPs' performance ratings and trainees' self-ratings were compared to the performance ratings by IPs and trainees in a control group. The results indicate no difference in IP ratings or trainees' self-ratings for the control and experimental groups. The results indicated that the major beneficial role of a real-time oculometer system for pilots and copilots having a significant amount of flight experience would be for problem solving or refinement of instrument scanning behavior rather than a general instructional scheme. It is suggested that this line of research be continued with the incorporation of objective data (e.g., state of the aircraft data), measures of cost effectiveness and with trainees having less flight experience. Author

N83-20553*# Old Dominion Univ., Norfolk, Va.
THE EFFECTIVENESS OF AN OCULOMETER TRAINING TAPE ON PILOT AND COPILOT TRAINEES IN A COMMERCIAL FLIGHT TRAINING PROGRAM Final Report

D. H. JONES, G. D. COATES, and R. H. KIRBY Washington
NASA Mar. 1983 75 p refs
(Contract NAS1-15648)
(NASA-CR-3666; NAS 1.26:3666; REPT-81-25) Avail: NTIS HC
A04/MF A01 CSCL 051

A study was designed to evaluate the effectiveness of a video tape detailing the various aspects of instrument scanning by experienced pilots on performance by pilots and copilots undergoing flight training in a Boeing 737 flight simulator. The performance ratings by instructor pilots (IP's) and self-reported instrument scan behavior by trainees were compared with those of a control group. The results indicated that the training tape had little or no effect on performance by trainees in the experimental group. Feedback from the IP's and trainees suggested that a feedback strategy providing each trainee's individual instrument scan behavior might be more beneficial in flight training than the general instructional strategy of the oculometer training tape. Flight training personnel and trainees' reports of performance decrements on or around the third day of flight simulator training were investigated. The IP's performance ratings of 27 pilot and copilot trainees failed to reveal a systematic performance decrement; however, feedback from the trainees revealed that their own attribution of performance decrements was associated with the order in which their training occurred within a session. Further research was suggested. Author

N83-20554# Committee on Science and Technology (U. S. House). Subcomm. on Science, Research and Technology.
THE HUMAN FACTOR IN INNOVATION AND PRODUCTIVITY INCLUDING AN ANALYSIS OF HEARINGS ON THE HUMAN FACTOR

W. H. SCHACHT Washington GPO 1982 43 p Presented to the Comm. on Sci. and Technol., 97th Congr., 2d Sess., Oct. 1982 Prepared by the Library of Congr., Congr., Res. Serv. (GPO-99-557) Avail: US Capitol, House Document Room

The human factor in innovation and productivity is considered. Author

N83-20555# Army Aeromedical Research Lab., Fort Rucker, Ala. Biomedical Applications Research Div.

PSYCHOLOGICAL EFFECTS OF CHEMICAL DEFENSE ENSEMBLE IMPOSED HEAT STRESS ON ARMY AVIATORS Final Report

B. E. HAMILTON, R. R. SIMMONS, and K. A. KIMBALL Nov. 1982 34 p refs
(Contract DA PROJ. 3E1-62777-A-879)
(AD-A121956; USAARL-83-6) Avail: NTIS HC A03/MF A01 CSCL 06Q

Psychological testing was conducted with six Army aviators before and after flights in a UH-1H helicopter while wearing standard flight suits, US or UK aircrew chemical defense ensembles. Additional testing on non-flight days was conducted to provide a baseline for evaluation. Tests consisted of encode/decode problems, math problems, logical reasoning problems, target detection problems, and a four-choice reaction time test. Tests were scored for number of attempted, percent correct, reaction time of correct and incorrect responses. Self reports of mood were also taken and scored. The results of the study indicated that various levels of ensemble-imposed heat stress caused orderly changes in psychological function and extended the results of laboratory investigations to the aviation setting. In addition, reaction time data showed changes in the pilot's ability to deal with error situations as a function of imposed heat stress and that self reports of mood were unreliable indicators of severe heat stress. Author (GRA)

N83-20556# Naval Training Analysis and Evaluation Group, Orlando, Fla.

EVALUATION OF THE COMPUTER AIDED TRAINING EVALUATION AND SCHEDULING (CATES) DECISION MODEL FOR ASSESSING FLIGHT TASK PROFICIENCY

W. C. MCDANIEL, B. M. PEREYRA, W. C. RANKIN, and P. G. SCOTT Sep. 1982 58 p refs
(AD-A121800; TAEG-TR-130) Avail: NTIS HC A04/MF A01 CSCL 051

Determining student performance level and subsequent decisions to either continue or stop training has posed a perplexing problem for instructors and training managers who provide pilot training. In flight pilot training involves both highly skilled human resources as well as sophisticated equipment. Therefore, training continued beyond established training objectives is costly. However, terminating training before the student pilot achieves the required skills is highly undesirable. A previous study (TAEG Report No. 94) proposed a Computer Aided Training Evaluation and scheduling (CATES) system to improve proficiency judgments during in flight training. This present study compared the efficacy of the CATES system with the present system of human judgment for assessing performance in flight training with regard to efficiency in reaching decisions and quality of decisions. The study also demonstrated that the CATES system can be used with some advantage in actual flight training program. Author (GRA)

N83-20557# Cornell Univ., Ithaca, N. Y. Dept. of Education.
THE INFORMATION CONTENT OF PICTURE-TEXT ASSEMBLY INSTRUCTIONS Technical Progress Report, 1 Sep. 1981 - 31 Mar. 1982

G. R. BIEGER and M. D. GLOCK Mar. 1982 38 p refs
Sponsored in part by the Hatch Fund
(Contract N00014-80-C-0372; RR0420602; NR PROJ. 157-452)
(AD-A120860; TR-6-SER-B; TR-5) Avail: NTIS HC A03/MF A01 CSCL 051

A taxonomy of the categories of information depicted in picture-text instructions for two procedural assembly tasks was developed and used experimentally. Three categories of information were hypothesized to be the necessary and sufficient information for successful execution of the procedures. Various combinations of information were presented to 108 subjects, each in one of 36 instructional conditions. Comparisons of performance data for two tasks indicated that subjects using complete instructions finished the assemblies in significantly less time and with significantly fewer

errors than did those using incomplete instructions, thus confirming the experimental hypothesis. Author (GRA)

N83-20558# Oklahoma Univ., Norman. Decision Processes Lab.

A PARTITION OF SMALL GROUP PREDECISION PERFORMANCE INTO INFORMATIONAL AND SOCIAL COMPONENTS Technical Progress Report, Sep. 1981 - Aug. 1982

J. T. CASEY, C. F. GETTYS, R. M. PLISKE, and T. MEHLE 30 Aug. 1982 34 p refs
(Contract N00014-80-C-0639; NR PROJ. 197-066)
(AD-A120714; TR-30-8-82) Avail: NTIS HC A03/MF A01
CSCL 05J

New theoretical and methodological techniques for partitioning and identifying the sources of performance differences between groups and individuals in hypothesis and act generation tasks are presented in two experiments. Experiment 1 presents a two-component model which separates group performance into informational and social components. The model proposes that the pooling of information in an interacting group (the information component) is mediated by the social factors (e.g., level of arousal, cohesiveness, etc.) which are present in a given situation. Interacting groups were found to be inferior to nominal groups in a hypothesis generation task. Thus, in Experiment 1, the social component was found to have a negative effect on performance. Experiment 2 further partitions the social component into a social information component which accounts for the additional information which becomes available as a result of group interaction and a social, non-informational component which consists of purely social factors. The social information component estimates the synergistic effect of group interaction on information retrieval and problem solving. The social informational component was estimated by including a group of subjects who exchanged ideas (information) via computers but had no social interaction. GRA

N83-20559# Oklahoma Univ., Norman. Decision Processes Lab.

ACT GENERATION PERFORMANCE: THE EFFECTS OF INCENTIVE Technical Progress Report, Sep. 1981 - Aug. 1982

R. M. PLISKE, C. F. GETTYS, C. A. MANNING, and J. T. CASEY 15 Aug. 1982 36 p refs
(Contract N00014-80-C-0639; NR PROJ. 197-066)
(AD-A120715; TR-15-8-82) Avail: NTIS HC A03/MF A01
CSCL 05J

Two experiments explored the generalizability of earlier research which indicated that human act generation performance was impoverished. Subjects were given a realistic decision problem and were asked to generate actions which could be taken to solve the problem. Subjects in two incentive conditions were offered monetary rewards for generating additional actions. Subjects in one condition were rewarded for the sheer quantity of actions produced and subjects in the other condition were rewarded for the quality of the actions produced. In a second experiment, both expert and naive subjects judged the quality of the actions produced by subjects in the first experiment. The results replicate earlier research in that most subjects generated relatively few actions and they also failed to generate important actions as rated by both expert and naive judges. There were no significant differences between the performance of subjects in the incentive conditions and subjects in the control condition. Thus, even when subjects are given substantial monetary incentives to generate additional actions, their act generation performance is impoverished. Differences in the act generation performance of the quantity and quality incentive conditions are discussed. Author (GRA)

N83-20560# Oklahoma Univ., Norman. Decision Processes Lab.

THE ROLE OF A DECISION MAKERS PERSPECTIVE IN THE GENERATION AND ASSESSMENT OF ACTIONS IN A CONFLICT SITUATION Technical Progress Report, Jan. - Sep. 1982

C. A. MANNING 15 Sep. 1982 46 p refs
(Contract N00014-80-C-0639; NR PROJ. 197-066)
(AD-A120738; TR-15-9-82) Avail: NTIS HC A03/MF A01
CSCL 05J

Two experiments were performed to assess the influence of perspective and information on the generation of actions an opponent might take to resolve a conflict. Both experiments employed a problem in which guerrilla forces captured the French Embassy in a hypothetical South American country and took the personnel hostage. In the first experiment, subjects were assigned the perspective of a guerrilla, a hostage, or an advisor to the President of France. Experiment 2 was performed to assess the effect of providing both a perspective and information about an opponent's objectives on the generation of actions the opponent might take to resolve a conflict. These results may suggest that perspective has only a limited influence on the generation and assessment of actions an opponent might take to resolve a conflict. Without further research, it is difficult to determine whether perspective impairs a decision maker's performance in a conflict situation or whether its influence is only salient in hindsight. GRA

N83-20561# Decision Research Corp., Eugene, Oreg.

CATEGORICAL CONFIDENCE

B. FISCHHOFF, D. MACGREGOR, and S. LICHTENSTEIN Jul. 1982 34 p refs
(Contract N00014-80-C-0150)
(AD-A120555; PTR-1092-82-7) Avail: NTIS HC A03/MF A01
CSCL 05J

The present study attempted to improve the appropriateness of confidence with a seemingly nondirective task. Subjects were asked to sort items into a specified number of piles according to their confidence in the correctness of their answers. Subsequently, they assigned a number of each pile expressing the probability that each item in the pile was correct. Even though this procedure differed from its predecessors in many respects, performance here was indistinguishable from that observed elsewhere. Though small pockets of improvement were noted, confidence was largely resistant to this manipulation. Some implications of these results for attempts to study confidence and eliminate overconfidence are discussed. GRA

N83-20562# Michigan Univ., Ann Arbor. Perception Lab.

VISUAL FORM DETECTION IN 3-DIMENSIONAL SPACE

W. R. UTTAL Oct. 1982 249 p refs
(Contract N00014-81-C-0266; RR04209002)
(AD-A120448; PERLAB-002) Avail: NTIS HC A11/MF A01
CSCL 05A

This monograph presents the results of a program of research dealing with the detection of dotted stimulus forms embedded in dotted visual noise. Nineteen experiments are described concerning the detection of single flashing dots, dotted lines, and both random and regularly dotted planes. A mathematical model based upon the autocorrelational transform is also tested for some of the experiments. Among the most important findings are a remarkable insensitivity of the perceptual system to temporal and spatial irregularities and a qualitative difference in the way observers deal with planes formed from random dot arrays and dotted outlines respectively. The autocorrelation model is in general agreement with the psychophysical results against which it is tested. The main conclusion arising from this research may be summarized as the rule of linear periodicity. Observers are sensitive to forms to the extent that they contain dotted, straight lines with equal interdot spacing. This sensitivity appears to be a primitive of visual perception in a manner that is analogous to the sensitivity exhibited by the autocorrelation to periodic forms. Historical and lexicographic matters pertaining to the problem of form perception are also discussed in this monograph. Author (GRA)

53 BEHAVIORAL SCIENCES

N83-20563# Maryland Univ., College Park. Coll. of Business and Management.

THE EFFECT OF SELF-EFFICACY, GOALS AND TASK STRATEGIES ON TASK PERFORMANCE

E. A. LOCKE, E. ZUBRITZKY, C. LEE, and P. BOBKO Nov. 1982 43 p refs

(Contract N00014-79-C-0680)

(AD-A121490; GS-18-ONR) Avail: NTIS HC A03/MF A01

CSCL 051

This study examined the effect of self-efficacy, goals, and task strategies on goal choice and task performance. Self-efficacy and task strategies were manipulated through training. Ability, past performance and self-efficacy were the major predictors of goal choice. Ability, self-efficacy, goals and task strategies were all related to task performance. Self-efficacy was more strongly related to past performance than to future performance but was still a significant predictor of future performance when past performance was controlled. Self-efficacy ratings for moderate to difficult levels of performance were the best predictors of future performance. This finding was replicated when two previous goal setting studies, which had found no positive expectancy-performance relationship across goal groups, were re-analyzed. It is suggested that the concept of self-efficacy might provide an integrating mechanism between the goal setting and social learning theory approaches to task performance. GRA

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

A83-23496

ERGONOMIC ANALYSIS AND EVALUATION PROCEDURES FOR COCKPIT OPERATING POSITIONS [ERGONOMISCHES ANALYSE- UND BEWERTUNGSVERFAHREN FUER COCKPITARBEITSPLAETZE]

R. BARTH (Hochschule fuer Verkehrswesen, Dresden, East Germany) Technisch-Oekonomische Information der zivilen Luftfahrt, vol. 18, no. 4, 1982, p. 145-152. In German. refs

The piloting of an airliner represents an operation of great responsibility. In connection with the performance of this operation, the crew members are subjected to many stresses. In addition to stresses directly related to the task of piloting the aircraft, there are a number of additional stresses as a consequence of a variety of different factors. Existing directions concerning an evaluation of the stresses to which the flying personnel is subjected cannot completely take into account all the various factors involved. Little information exists, therefore, regarding a suitable basis for an ergonomic design of flying activities. Attention is given to an ergonomic complex analysis considered by the research association for occupational medicine of the German Democratic Republic in 1972. Certain difficulties regarding an application of this analysis to the activities in the cockpit are pointed out. An approach for overcoming these difficulties is discussed, taking into account the suitable selection of an appropriate ergonomic analysis and evaluation procedure. G.R.

A83-23612

SELECTING PARTS AND MATERIALS FOR STERILIZED ELECTRONICS

S. M. S. ALVI (Aerospace Corp., El Segundo, CA) In: Material and process advances '82; Proceedings of the Fourteenth National SAMPE Technical Conference, Atlanta, GA, October 12-14, 1982. Azusa, CA, Society for the Advancement of Material and Process Engineering, 1982, p. 106-126. refs

The electronics carried by interplanetary landing craft and medical devices implanted in the human body must undergo

sterilization. Some of the metallic alloys commonly used in electronics, however, exhibit paradoxical property changes after exposure to sterilization temperatures. About 20% of the parts which are normally required to possess high reliability are incompatible with sterilization. Significant limitations on the design and selection of hookup wires, coatings, and RFI shielding are imposed by the effects of temperature on electrical insulation and dielectric materials. The sterilization requirement redefines reliability criteria to include 'sterility confidence' and 'poststerilization life cycle' elements. O.C.

A83-23791

SCATTERING AND ABSORPTION CHARACTERISTICS OF LOSSY DIELECTRIC OBJECTS EXPOSED TO THE NEAR FIELDS OF APERTURE SOURCES

A. LAKHTAKIA and M. F. ISKANDER (Utah, University, Salt Lake City, UT) IEEE Transactions on Antennas and Propagation, vol. AP-31, Jan. 1983, p. 111-120. refs

(Contract F33615-79-C-0614)

The extended boundary condition method (EBCM) is used to obtain the absorption and scattering characteristics of lossy dielectric prolate spheroidal models of biological objects exposed to the near fields of large aperture sources. Two equivalent methods are employed to expand the incident fields, from the aperture sources, in terms of the vector spherical harmonics about the spheroidal origin. The results obtained for a spheroid located a large distance away from the aperture source agree well with those obtained from the corresponding plane-wave irradiation studies. Other near-field absorption characteristics are examined, and the applicability conditions for each of the two methods for obtaining the incident field expansions are discussed. In particular, it is emphasized that meaningful evaluation of hazardous levels of electromagnetic radiation should be made in terms of the magnitudes and the directions of the electric- and magnetic-field components, rather than the incident power density level. The calculated results also conform to the understanding previously obtained from studying irradiation of the spheroidal models of biological interest by plane waves and by near fields of various elementary radiation sources. (Author)

A83-23825

LOCOMOTION IN ANTHROPOMORPHIC MECHANISMS [PEREMESHCHENIE ANTROPOMORFNYKH MEKHANIZMOV]

A. M. FORMALSKII Moscow, Izdatel'stvo Nauka, 1982. 368 p. In Russian. refs

The use of impulse inputs to control the walking of anthropomorphic mechanisms (on two legs) comprising five to seven units is investigated. It is noted that the dynamics and control of walking are important in modeling human locomotion and in designing robots and prosthetic devices. In the control through impulse inputs treated here, the mechanism's locomotion is synthesized using motions governed by inertia (ballistic motion). The problems encountered in synthesizing locomotion are related to a variety of problems in theoretical mechanics dealing with the motion of conservative systems, impact phenomena, and interactions with constraints. Many of these problems are solved here. Both analytical and numerical results are presented. C.R.

A83-23863

AN AUTOMATIC SYSTEM FOR THE EVALUATION OF THE PSYCHOPHYSIOLOGICAL CONDITION OF AN OPERATOR ACCORDING TO EKG PARAMETERS [AVTOMATICHESKII KOMPLEKS OTSENKI PSIKHOFIZIOLOGICHESKOGO SOSTOIANIIA OPERATORA PO PARAMETRAM EKG]

IU. P. GORGO and IU. B. RUBTSOV Problemy Bioniki, no. 29, 1982, p. 67-74. In Russian. refs

An apparatus is developed for the automatic measurement of the R-R interval of the EKG for an operator in motion in order to evaluate the psychophysiological condition and the quality of work of the operator. The apparatus also determines the histogram of the cardiac interval and provides a rapid analysis of these histograms. The degree of contraction of the histogram obtained in the course of an operator's work is compared to its initial form,

which serves as a criterion of the concentrated work of the operator. It is concluded that the contraction of the histograms of the EKG R-R interval distribution as compared to the normal individual histograms can serve as an accurate indicator of an operator's work and the quality of his activity. N.B.

A83-23864

THE MODELING OF RESPIRATORY ARHYTHMIA [MODELIROVANIE DYKHATEL'NOI ARITMI]

P. V. VASILIK, O. A. KRIVOVA, and A. A. POPOV Problemy Bioniki, no. 29, 1982, p. 109-114. In Russian. refs

A mathematical model based on the hypothesis of the modulation of the cardiac oscillator by the respiratory oscillator is developed to describe the respiratory arrhythmia of the heart rate. The respiratory oscillator is described using Volterra's equations, while the cardiac oscillator is described using van der Pol's equations. By an appropriate choice of coefficients, the model provides values for the respiratory rate which are in good agreement with the actual values determined from the R-R intervals of the EKG. The model is used to investigate the modulation of the respiratory variations of the heart rate (the second level modulations), as well as the changes in the relationship between the phases of breathing and respiratory arrhythmia. N.B.

A83-23885

ELECTROMAGNETIC RADIATION EMISSIONS FROM VISUAL DISPLAY UNITS - A REVIEW

E. A. COX (Health and Safety Executive, London, England) Displays, vol. 4, Jan. 1983, p. 7-10. refs

The suggestion that workers using visual display units may be exposed to potentially hazardous electromagnetic radiations emitted by such equipment has raised the question of operational safety. In order to assess and quantify any risk a number of radiation surveys have been conducted in several countries. These surveys have followed different protocols and used a variety of field survey instruments. All have arrived at similar conclusions indicating that there are no significant levels of radiation to be found in any part of the electromagnetic spectrum emitted by such equipment.

(Author)

A83-24003#

STUDY OF +GZ PROTECTION GIVEN BY AN ANTI 'G' SUIT WORN ON TOP OF A LIQUID COOLED SUIT

A. K. SINGH (Indian Air Force, New Delhi, India) Aviation Medicine, vol. 26, Dec. 1982, p. 96-99.

An evaluation is presented of the +Gz protection given by an anti-g suit and a liquid-cooled suit designed to reduce the heat stress on four pilots. Ten healthy male subjects 22-30 years of age were subjected to experimental tests in a centrifuge in order to determine the protection given by the anti-g suit worn inside and outside the liquid-cooled suit. Results show a significant reduction of 0.47 g in the protection provided by the anti-g suit when worn on top of the liquid-cooled suit as compared to that provided by the suit when worn next to the skin. N.B.

A83-24092

CONVERGENCE ACCOMMODATION

D. KERSTEN and G. E. LEGGE (Minnesota, University, Minneapolis, MN) Optical Society of America, Journal, vol. 73, Mar. 1983, p. 332-338. refs

(Contract PHS-EY-02857)

Convergence accommodation is an accommodative response which accompanies a change in the state of convergence of the eyes. Fry (1940) defined convergence accommodation as 'that amount of accommodation which is fully associated with convergence when the need for exact focusing has been eliminated'. Fry's definition is used in the present investigation. Steady-state accommodation responses were measured in both eyes as a function of vergence angle and direction of lateral gaze. In the experiments, use was made of a binocular laser optometer which was constructed for measuring steady-state accommodation in both eyes. Two experiments were conducted. The first addressed the question of appropriate asymmetric convergence

accommodation. The second experiment was concerned with the issue of binocular night myopia. Accommodation was measured in diopters relative to the cornea. G.R.

A83-24093

INFORMATION IN OPTICAL FLOWS INDUCED BY CURVED PATHS OF OBSERVATION

J. H. RIEGER (Massachusetts, University, Amherst, MA) Optical Society of America, Journal, vol. 73, Mar. 1983, p. 339-344. refs

For a moving observer it is essential to foresee the locomotor course with respect to structures in the environment. Optical flows that are available to a moving observer contain powerful information for visual kinesthesia. In general, optical flows consist of separable translational and rotational components. The information examined here is contained completely in the translational component and its time derivatives. Curved paths of observation are specified by different orientations of the translational components of optical velocity and acceleration fields. Obstacles and their temporal separation from a curvilinearly moving observer are specified in the optical flow, as is the angle of collision. (Author)

A83-24356*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

ENVIRONMENTAL CONTROL AND LIFE SUPPORT - PARTIALLY CLOSED SYSTEM WILL SAVE BIG MONEY

W. W. GUY (NASA, Johnson Space Center, Houston, TX) Astronautics and Aeronautics, vol. 21, Mar. 1983, p. 50-53.

Although the NASA space station has not yet been completely defined, realistic estimates may be made of the environmental control and life support system requirements entailed by a crew of eight, a resupply interval of 90 days, an initial launch which includes expendables for the first resupply interval, 7.86 lb/day of water per person, etc. An appraisal of these requirements is presented which strongly suggests the utility of a partially closed life support system. Such a scheme would give the crew high quality water to drink, and recycle nonpotable water from hand washing, bathing, clothes and dish washing, and urinal flushing. The excess recovery process water is electrolyzed to provide metabolic and leakage oxygen. The crew would drink electrolysis water and atmospheric humidity control moisture-derived water. O.C.

A83-24359*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

HUMAN CAPABILITIES: LONG RESIDENCE - AN UNCHARTED FIELD

A. CHAMBERS (NASA, Ames Research Center, Moffett Field, CA) Astronautics and Aeronautics, vol. 21, Mar. 1983, p. 61-63.

In the context of the planned NASA space station, it is anticipated that a number of problems will be posed by permanent residence in space. Not only will the intensive training which has characterized earlier manned programs diminish under the pressure of increased launch rates, but the new and larger crews will socially, educationally, psychologically and physiologically constitute a far more heterogeneous group than those of the past. In addition, advanced computer technology will result in a degree of reliance on onboard data processing which will alter the relations of ground and space operators, requiring careful integration of people and technologies. Attention is given to questions of food, robotics, extravehicular activity, hygiene and environmental noise. O.C.

A83-24706* California Univ., Berkeley.

MULTIPULSE CONTROL OF SACCADIC EYE MOVEMENTS

S. L. LEHMAN and L. STARK (California, University, Berkeley, CA) In: Conference on Decision and Control, 20th, and Symposium on Adaptive Processes, San Diego, CA, December 16-18, 1981, Proceedings. Volume 1. New York, Institute of Electrical and Electronics Engineers, 1981, p. 141-146. refs

(Contract NCC2-86)

We present three conclusions regarding the neural control of saccadic eye movements, resulting from comparisons between recorded movements and computer simulations. The controller signal to the muscles is probably a multipulse-step. This kind of

signal drives the fastest model trajectories. Finally, multipulse signals explain differences between model and electrophysiological results. (Author)

A83-24764* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CONTROL PROBLEMS IN AUTONOMOUS LIFE SUPPORT SYSTEMS

S. P. COLOMBANO, S. H. SCHWARTZKOPF, and R. D. MACELROY (NASA, Ames Research Center, Moffett Field, CA) In: Conference on Decision and Control, 20th, and Symposium on Adaptive Processes, San Diego, CA, December 16-18, 1981, Proceedings. Volume 2. New York, Institute of Electrical and Electronics Engineers, 1981, p. 748-750. refs

Autonomous Life Support Systems (ALSS) are envisioned for long range permanence in space. ALSS would require little or no input of matter for extended periods of time. The design of such a system involves an understanding of both ecological principles and control theory of nonlinear, ill-defined systems. A distinction is drawn between ecosystem survival strategies and the aims of control theory. Experimental work is under way to help combine the two approaches. (Author)

A83-25664* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EVALUATION OF A REVERSE GRADIENT GARMENT FOR PREVENTION OF BED-REST DECONDITIONING

H. SANDLER, D. DOLKAS, B. NEWSOM (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA), P. WEBB, J. ANNIS (Webb Associates, Yellow Springs, OH), N. PACE, and B. W. GRUNBAUM (California, University, Berkeley, CA) Aviation, Space, and Environmental Medicine, vol. 54, Mar. 1983, p. 191-201. refs

A Reverse Gradient Garment (RGG) was used to intermittently induce venous pooling in the extremities of a magnitude similar to that seen in going from a lying to standing position during the course of a 15-d period of horizontal bed rest. Venous pooling failed to improve bed-rest-induced losses in +2.5 Gz and +3.0 Gz centrifugation tolerance or to prevent increased heart-rate responses to lower-body negative pressure (LBNP). Four subjects served as controls, four were treated. Tests during the 7-d recovery period showed fluid/electrolyte and body composition values to have returned to pre-bed-rest levels with continued depression of acceleration tolerance times (56% decreased at +2.5 Gz and 74% decreased at +3.0 Gz compared to pre-bed-rest levels) and exaggerated blood insulin response on glucose tolerance testing (blood insulin for treated group increased 95% at 1 h before bed rest and 465% during recovery). This study demonstrates that the physiologic changes after bed rest persist for significant periods of time. Acceleration tolerance time proved to be a sensitive test for the deconditioning process. (Author)

A83-25676#

SPACE STATION ENVIRONMENTAL, THERMAL CONTROL AND LIFE SUPPORT /ETCLS/ - MEETING THE EVOLUTIONARY GROWTH CHALLENGE

H. F. BROSE (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT) American Society of Mechanical Engineers, Winter Annual Meeting, Phoenix, AZ, Nov. 14-19, 1982, 6 p. (ASME PAPER 82-WA/AERO-1)

An evolutionary scenario for the growth of a space station environmental, thermal control, and life support (ETCLS) is considered, including architectural influences and technology preparedness planning. The ETCLS functions comprise cabin ventilation and thermal control, heat transport and rejection, atmosphere supply and revitalization, water processing and management, and health and hygiene functions. An initial step is predicted to be a combination of existing Shuttle and Spacelab technology, coupled with a CO₂ removal system and a condensate water clean-up system for hygiene and heat rejection. Wastewater processing would follow, leading to oxygen and water closed-loop operation. The early designs are recommended to project open-loop configurations which can later be shifted to closed-loop functions.

Considerations impinging on choices of configurations for the power system, reaction control system, cryogenics sources, resupply and Shuttle visits, and station growth steps are discussed. Subsystem concept technologies testing is suggested to be necessary in the short term, and specific on-orbit tests which are possible are noted. M.S.K.

A83-25757

SPACELAB ECLS FOLLOW-ON-DEVELOPMENT

A. I. SKOOG (Dornier System GmbH, Friedrichshafen, West Germany) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982, SAE 11 p. refs (SAE PAPER 820848)

The follow-on development program of Spacelab's environmental control and life support system is described with reference to plans to make Spacelab compatible with Shuttle improvements and the addition of a power extension package. Modifications due to increased mission duration include changes in nitrogen storage capacity, carbon dioxide removal capacity and both reliability and maintainability. Attention is given to avionics fan speed control, the Spacelab baseline, and such performance requirements as CO₂ partial pressure, temperature, ventilation, and O₂ partial pressure. A planned experimental module is described. S.C.S.

A83-25775

SPACELAB ECLS CURRENT STATUS

P. LAUTENBACH (Dornier System GmbH, Friedrichshafen, West Germany) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 12th, San Diego, CA, July 19-21, 1982, SAE 11 p. Research supported by ERNO Raumfahrttechnik GmbH. (SAE PAPER 820884)

The functions and components of the Spacelab Environmental Control/Life Support Subsystem (ECLS) are examined with particular reference to Flight Unit hardware status and potential atmospheric interaction with the Shuttle Orbiter ECS. The ECLS is designed to provide a habitable earth-like atmosphere in the Spacelab cabin, by means of atmospheric total and oxygen partial pressure control, temperature, humidity and CO₂ control, ventilation and air filtration, air cooling and contingency support to the crew, mission and vehicle. The Atmosphere Storage and Control Section performs functions of module pressurization under automatic command. The Atmospheric Revitalization Section consists of two air loops to provide a thermally conditioned crew environment and a temperature-controlled environment for avionics equipment. Recent hardware changes have been necessitated by both results of qualification testing and changes implemented under the Orbiter program. Computerized simulations of Orbiter-Spacelab atmospheric interactions have demonstrated the need for manual procedures for Spacelab O₂ and N₂ control. Extensive development and qualification testing has proven the capability of the first Spacelab Flight Unit, and manufacturing and delivery have begun on the second unit. A.L.W.

A83-25999

WHOLE-BODY VIBRATION AND INTERNATIONAL STANDARD ISO 2631 - A CRITIQUE

D. J. OBORNE (Swansea, University College, Swansea, Wales) Human Factors, vol. 25, Feb. 1983, p. 55-69. refs

The present International Standard for human response to whole-body vibration (ISO 2631) has been in effect since 1974. This standard is used to assess the effect of environmental vibration on operator health, efficiency, and comfort. This paper discusses the derivation of the standard and the bases upon which its main propositions were formed. Some aspects of the standard are supported by empirical data; however, this paper highlights a number of deficiencies that call into question the appropriateness of the standard for application. In particular, the shape of the frequency weighting curves, the concept of time dependency, the response criteria, and the weighting method for nonsinusoidal.

vibrations are examined in the light of published experimental findings. (Author)

A83-26088#

OPERATIONAL UTILIZATION STUDY ON NEW HUMAN CENTRIFUGE OF JASDF. II - CAPABILITY AND USABILITY OF THE NEW SYSTEMS

M. ONO, W. MITSUHASHI, and M. OSHIBUCHI (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan) Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 23, Sept. 1982, p. 103-115. In Japanese, with abstract in English.

Performance characteristics of a human centrifuge for pilot g-force training for the Japan Air Self Defense Force are described. The 8 m arm provides a maximum onset rate of 2.5 g/sec and a maximum sustained level of 9 g, or 15 g for an animal. Pilots can be exposed to target detection tasks on a visual tracker, i.e., an HUD, and respond with a control stick and rudder pedal from the F-15. Physiological monitoring systems furnish ECG, respiration, and oxygen saturation data. Besides combat training, the facility will be used for developing anti-g suits, helmets, and oxygen masks. D.H.K.

A83-26089#

OPERATIONAL UTILIZATION STUDY ON NEW HUMAN CENTRIFUGE OF JASDF. III - MEASUREMENT OF A THREE-AXIS ACCELERATION FORCE IN HUMAN CENTRIFUGE

A. ONOZAWA, S. OGATA, and A. KADOO (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan) Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 23, Sept. 1982, p. 117-135. In Japanese, with abstract in English. refs

The acceleration forces along three axes in the gondola of an 8 m centrifuge arm of the Japan Aeromedical Laboratory were measured with an instrumented mannequin's head. A peak g-force of 1.5-2.0 was determined in the x-direction, together with 1.5-2.5 g in the y direction. Decrements were observed with increase in extension in the z-direction, and were found to proceed asymptotically. Subjective sensations experienced by human subjects are reported. D.H.K.

A83-26090#

OPERATIONAL UTILIZATION STUDY ON NEW HUMAN CENTRIFUGE OF JASDF. IV - TEST AND EVALUATION OF ANTI-G SYSTEM

W. OGAWA, K. SHIMIZU, K. TAGAMI, N. KAWABATA, and F. TOMITA (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan) Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 23, Sept. 1982, p. 137-148. In Japanese, with abstract in English. refs

Tests results of a new anti-g suit worn in trials in the Japan Aeromedical Laboratory 8 m centrifuge are reported. One dummy and five human subjects were exposed to 12 different patterns of g-forces, including 5 g and 6 g peaks, onset rates of 0.1-2.5 g/sec, and intervals of 0.5 g/sec. An inverse relationship was found for the onset rate of the g-forces and the response time of the anti-g suit. Outlet pressure peaks were the values required by the MIL specs of 1.5 g/sec onset at 5 g and 2.0 g/sec onset at 6 g. The suit responses, as sensed by pressure transducers, were equal for both the dummy and the humans wearing the suit. D.H.K.

A83-26302

APPLICATION OF ADVANCED SPEECH TECHNOLOGY /AST/ IN MANNED PENETRATION BOMBERS

R. A. NORTH and S. J. MOUNTFORD (Honeywell Systems and Research Center, Minneapolis, MN) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 48-52.

(Contract F33615-80-C-3606)

A methodology is presented for the identification of the most beneficial test candidates for advanced speech technology in an airborne crewstation. The method combines human factor analysis techniques, user involvement, and the intelligent use of technological projections in order to produce a tradeoff matrix that ranks each task for pilot utility and technological feasibility. Information retrieval from flight manuals and programming tasks are considered as high utility candidates for the use of speech technology in the cockpit. N.B.

A83-26304

SPACE TELESCOPE NEUTRAL BUOYANCY MOCKUP - A TEST BED FOR EVALUATING MAN/SYSTEM INTERFACES

E. C. PRUETT and K. B. ROBERTSON (Essex Corp., Huntsville, AL) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 59-63.

A man/system simulation test program is being conducted at NASA's Marshall Space Flight Center (MSFC) to support design and evaluation of crew interface hardware used in the Space Telescope (ST) on-orbit servicing tasks. A neutral buoyancy (NB) mockup of the telescope developed for MSFC was used as a test bed for evaluating many proposed crew interfaces associated with changeout of the scientific instruments and support systems. Tests were conducted in MSFC's NB simulator under simulated weightless conditions using pressure-suited crew members as test subjects. Test results are presented, including suggestions and recommendations for the design of tools, crew restraints, instrument stowage and transfer devices, and insertion guidrails. A final discussion applies the lessons learned from Space Telescope to the design of other serviceable spacecraft. (Author)

A83-26306

DEVELOPMENT OF A SIMULATOR CERTIFICATION /SIMCERT/ METHODOLOGY FOR SAC

G. M. HOUTMAN (USAF, Instructional Systems Development Div., Castle AFB, CA), K. R. LAUGHERY, JR., and J. L. DITZIAN (Calspan Corp., Buffalo, NY) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 69-73. refs

The U.S. Air Force's Simulator Certification (SIMCERT) regulation requires that training devices provide student training and performance evaluation on specific aircrew training events, and stipulates that each using command must develop its own supplement to guide command-specific programs. Two SIMCERT methodologies were developed for the Strategic Air Command's SIMCERT program; one for initial qualification training, and another for continuation training. Parts of the initial qualification SIMCERT methodology were validated on the Boom Operator Part Task Trainer at Castle AFB, California. The SIMCERT supplement for this methodology is currently in draft form, and will be completed in time for full scale application to the B-52 and KC-135 Weapon System Trainers. O.C.

A83-26307

THE LIMITATION OF HUMAN PERFORMANCE IN EXTREME HEAT CONDITIONS

P. A. HANCOCK (Illinois, University, Champaign, IL) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 74-78. refs

The current communication seeks to extend the description of human performance in thermally stressful environments and reports on the systematic changes in impairment onset with tasks requiring

differing levels of response complexity in varying time, Effective Temperature (E.T.) conditions. These thresholds of performance decrement are subsequently equated with absolute rises in operator deep body temperature. (Author)

A83-26310* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

HUMAN FACTORS IN EQUIPMENT DEVELOPMENT FOR THE SPACE SHUTTLE - A STUDY OF THE GENERAL PURPOSE WORK STATION

M. K. JUNGE (NASA, Ames Research Center, Life Sciences Flight Experiments Projects Office, Moffett Field, CA) and M. J. GIACOMI (California State University, Northridge, CA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 218-222.

The results of a human factors test to assay the suitability of a prototype general purpose work station (GPWS) for biosciences experiments on the fourth Spacelab mission are reported. The evaluation was performed to verify that users of the GPWS would optimally interact with the GPWS configuration and instrumentation. Six male subjects sat on stools positioned to allow assimilation of the zero-g body posture. Trials were run concerning the operator viewing angles facing the console, the console color, procedures for injecting rates with dye, a rat blood cell count, mouse dissection, squirrel monkey transfer, and plant fixation. The trials were run for several days in order to gauge improvement or poor performance conditions. Better access to the work surface was found necessary, together with more distinct and better located LEDs, better access window latches, clearer sequences on control buttons, color-coded sequential buttons, and provisions made for an intercom system when operators of the GPWS work in tandem. M.S.K.

A83-26315

SELECTION OF REMOTELY LABELED SWITCH FUNCTIONS DURING DUAL TASK PERFORMANCE

S. B. HOTTMAN (Systems Research Laboratories, Inc., Dayton, OH) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 240-242. refs

Research was conducted to determine the optimal qualities of a controller to select menus on an interactive display. The menu selection controllers were an eight-position joystick, a 3 x 3 keyboard and a 2 x 4 keyboard. The experimental task involved subjects centering a cursor on a CRT display with a joystick while periodically engaged in a menu selection task with the left hand without observing the controllers. The study investigated type of controller and movement position effect on response time and positioning errors when selecting menus. The selection locations on the menu were all sequentially numbered. Results of this study indicate that mean response time did not vary across controllers used or movements performed. However, positioning errors using the joystick were found to be significantly higher than for the keyboards. Results indicate that of the equipment studied in these experiments the 3 x 3 keyboard should be used and menu positions should be in a sequential order. (Author)

A83-26316

HOW TO GET A GRIP ON TADS/PNVS

F. W. TRABOLD, JR. and M. T. HOUSMAN (Martin Marietta Aerospace, Orlando, FL) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 250-253.

Human factors trade-off studies in the design of multifunction handgrips for modern military helicopters are described and discussed. The design criteria were defined as maximum comfort and minimum fatigue, no sharp edges, accommodation of the 5th-95th percentile sized hand and arm reach, critical controls assigned to thumb and forefinger, and no use of the little finger. Noncritical pushbuttons were assigned to the middle and ring finger, simultaneously operated controls were placed on opposite handgrips, and loads were balanced between handgrips. Pistol grips were required, as well as minimized obscuration of

instrumentation, palm rests were provided, and the handgrips were fixed. The actual angular positioning of the handgrips are discussed, together with the results of a handgrip rotation experiment. The controls which needed the highest dexterity to manipulate were assigned to the right thumb. M.S.K.

A83-26317

AUTOMATIC RETURN IN MULTIFUNCTION CONTROL LOGIC

A. J. ARETZ and C. J. KOPALA (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 254-256.

The feasibility of automating the return function in a multifunction control device situated in a fighter aircraft cockpit has been investigated, for the case of an automatic return function which takes the control logic from any 'menu' page back to the first page if the pilot does not select additional functions during a predetermined time period. A flight simulation evaluated the acceptability of 5-, 10-, and 15-sec return periods. While no significant performance differences were noted for these three periods, subjective questionnaire data indicated a clear pilot preference for return function automation with the 10-sec time period. O.C.

A83-26318

INTEGRATED CONTROL/DISPLAY UNIT VS. DEDICATED CONTROL HEADS FOR RADIO TUNING IN A KC-135 FLIGHT SIMULATOR

D. A. WARNER (Bunker Ramo Corp., Dayton, OH) and D. R. GUNNING (USAF, Aeronautical Systems Div., Wright-Patterson AFB, OH) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 258-262.

A two-part study was conducted in a KC-135 flight simulator to determine the appropriateness of replacing dedicated control heads with an integrated control/display unit (CDU) for accomplishing cockpit communication (UHF, HF) and navigation (VOR) radio tuning. The CDU is being evaluated as a means of decreasing pilot workload to potentially enable a proposed reduction in KC-135 crew size. During both individual tuning tasks and simulated missions, time and error data were collected comparing pilot performance for the two tuning methods. Although subjective opinion favored the CDU concept, objective results indicated that the conventional tuning method (except HF) was faster. Various features of the CDU plus relative subject inexperience using the CDU were probable contributors to these unexpected results. Subsequent reevaluation is scheduled to occur incorporating changes which are designed to enhance CDU operability. (Author)

A83-26323

THE MODEL HUMAN PROCESSOR - A MODEL FOR MAKING ENGINEERING CALCULATIONS OF HUMAN PERFORMANCE

S. K. CARD (Xerox Palo Alto Research Center, Palo Alto, CA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. 301-305. refs

A theoretical model human processor (MHP) is developed from the human performance measurement data base of cognitive psychology to serve as a guide for the design of the human factors in interactive computer systems. The MHP features memory parameters defined in terms of the storage capacity (items), the decay time of the items, and the main code type, either iconic, acoustic, visual, or semantic. Engineering system analysis proceeds using the cycle time as the sole processor parameter. Distinctions are drawn among the MHP partially coupled perceptual, cognitive, and motor processors. The operations of the MHP are considered as moving continuously from input to output. The perceptual processor allows data to flow into the working memory, which activates the motor programs. The basic principle of the MHP is a recognize-act cycle. M.S.K.

A83-26325**METHODOLOGICAL INVESTIGATION OF VIBRATION EFFECTS ON PERFORMANCE OF THREE TASKS**

J. C. GUIGNARD, A. C. BITTNER, JR., and R. C. CARTER (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA) In: Human Factors Society, Annual Meeting, 25th, Rochester, NY, October 12-16, 1981, Proceedings. Santa Monica, CA, Human Factors Society, 1981, p. Navy-supported research.

Twenty young Navy enlisted male volunteers were first rehearsed and then tested before, during, and after whole-body vibration. Fourteen were tested only at 8 Hz, and six were tested at 8 Hz/0.21 g rms, 16 Hz/0.43 g rms and 32 Hz/0.85 g rms; using three paper-and-pencil tasks involving visual, motor, and cognitive skills. The tasks were 'Spoke', a speed of tapping test; 'Aiming', a test of fine motor coordination; and 'Coding', involving mental computation. Results showed an approximately equal decrement effect across conditions in the Spoke and Coding (but not Aiming) tests that conforms with the frequency function embodied in the current international standard on human exposure to vibration. A modicum of previous vibration experience may be necessary before reliable data are obtained in this kind of testing. Implications for methodology and for the application of the current standard are briefly discussed. (Author)

A83-26479#**PROCEDURE FOR AN EVALUATION OF CONTROL SYSTEMS ON THE BASIS OF HUMAN FACTOR CONSIDERATIONS [VERFAHREN ZUR ANTHROPOTECHNISCHEN BEWERTUNG VON BEDIENSYSTEMEN]**

R. BEYER and F. V. SCHICK (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Flugfuehrung, Brunswick, West Germany) In: The Special Research Area of Flight Control, Colloquium, Brunswick, West Germany, September 9, 10, 1981, Reports. Brunswick, West Germany, Technische Universitaet Braunschweig, 1982, p. 96-117. In German.

In connection with the increasing number of control subsystems on board of transport aircraft, a situation has arisen in which it is very difficult to place additional control elements within an area which is easily accessible to the pilot. A novel operational control concept is, therefore, needed to overcome these difficulties. A brief description is given of the requirements which such a concept will have to satisfy. Brunner et al. (1979) have explored the capability of a central control device for satisfying these requirements. Remaining questions are related to an evaluation of the novel control system with respect to human factor considerations. The present investigation considers such an evaluation, taking into account a study conducted in a flight simulator. In the study participated as subjects 27 pilots of Boeing 747 aircraft. A suitable evaluation procedure is discussed, giving attention to the effects of the main stress factors on the control operations and on the assessment of the control system under study. G.R.

A83-26650**FREQUENCY LIMITATIONS AND OPTIMAL STEP SIZE FOR THE TWO-POINT CENTRAL DIFFERENCE DERIVATIVE ALGORITHM WITH APPLICATIONS TO HUMAN EYE MOVEMENT DATA**

A. T. BAHILL (Carnegie-Mellon University, Pittsburgh, PA) and J. D. McDONALD (Mitre Corp., Bedford, MA) IEEE Transactions on Biomedical Engineering, vol. BME-30, Mar. 1983, p. 191-194. Navy-supported research refs (Contract NSF ECS-81-21259)

There are many algorithms for calculating derivatives. The two-point central difference algorithm is the simplest. Besides simplicity, the two most important characteristics of this algorithm are accuracy and frequency response. The frequency content of the data prescribes a lower limit on the sampling rate. The smoothness and accuracy of the data determine the optimal step size. We discuss the low-pass filter characteristics of this algorithm and derive the optimal step size for two types of human eye movement data. To calculate the velocity of fast (saccadic) eye movements, the algorithm should have a cutoff frequency of 7.4

Hz. For typical slow (smooth pursuit) eye movements, a step size of 25 or 50 ms is optimal. (Author)

A83-26839**A NEW PROCEDURE FOR IMPROVING THE SOLUTION STABILITY AND EXTENDING THE FREQUENCY RANGE OF THE EBCM**

M. F. ISKANDER, A. LAKHTAKIA, and C. H. DUNEY (Utah, University, Salt Lake City, UT) IEEE Transactions on Antennas and Propagation, vol. AP-31, Mar. 1983, p. 317-324. refs

The procedure has two principal features. The first is that it is iterative, since it starts with a known solution that approximates the scattering problem. The other is that it involves separate field expansions in each of the overlapping subregions that describe the total interior volume of the object. By way of example, it is noted that for high-loss dielectric objects, the first step in the procedure is to replace the lossy dielectric object with a perfectly conducting one of the same shape and to solve the scattering problem to determine the current density on the surface of the conductor. This surface current is then used in calculating the induced field expansions inside the dielectric object. The numerical stability of the solution is shown to be further improved by dividing the interior region of the object into overlapping subregions, in each of which a separate field expansion is assumed. The electric and magnetic surface currents thus obtained from the solution of the internal problem are then used to improve the initial estimate of the current density on the surface of the object. C.R.

N83-19440# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).

EFFECT OF REEL-TYPE WEBBING RETRACTORS AND SHOULDER-BELT SLACK ON DUMMY-DYNAMICS DURING SIMULATED FRONTAL VEHICLE IMPACTS

T. J. BOWDEN, J. K. REICHERT, and A. K. NASSIM (Road and Motor Vehicle Traffic Safety) In AGARD Impact Injury Caused by Linear Acceleration: 12 p Oct. 1982 refs Avail: NTIS HC A21/MF A01

A Hy-Ge impact simulator was used for determining the performance of motor-vehicle seat belts equipped with retractors during simulated impacts at 13.5 m/n. The occupant of the seat was simulated by a standard anthropometric dummy. The shoulder strap of the seat belt was pulled various distances up to 25 cm away from the dummy chest before impact and the belt was then anchored near the retractor with fragile tape. The results of this study indicate that a retractor-equipped strap behaves less stiffly than a rigidly-anchored strap, allowing greatest forward motion of the body parts restrained by the strap and reducing the peak accelerations of these parts. In a harness in which the retractor is in the lap belt, the head and shoulder trajectories are similar to those when a harness without retractors is used. Author

N83-19441# Research Inst. for Road Vehicles, TNO, Delft (Netherlands).

MADYMO: A CRASH VICTIM SIMULATION COMPUTER PROGRAM FOR BIOMECHANICAL RESEARCH AND OPTIMIZATION OF DESIGNS FOR IMPACT INJURY PREVENTION

J. WISMANS, J. MALTHA, J. J. VANWIJK, and E. G. JANSSEN In AGARD Impact Injury Caused by Linear Acceleration: 11 p Oct. 1982 refs

Avail: NTIS HC A21/MF A01

A compact general purpose computer program package MADYMO, for two or three dimensional crash victim simulations is discussed. The program predicts the kinematic and dynamic behavior of the victim during the crash, based on data of the victim, the environment, the safety devices and the crash conditions. The package differs from most of the existing CVS programs by its flexibility in choice of number of linkages and number of elements in each linkage. Great flexibility in the modeling of force interactions between elements and environment is assured by the fact that user-defined submodels can readily be incorporated. The package is used for basic biomechanical crash research as well as for the development and optimization of crash safety

devices such as seat belts, child seats and vehicle paddings. Some recent applications of this program package, with special emphasis on the validity of the model and computer aided design aspects, are discussed. Author

N83-19447# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

EVIDENCE FOR THE UTILIZATION OF DYNAMIC PRELOAD IN IMPACT INJURY PREVENTION

B. F. HEARON, J. H. RADDIN, JR., and J. W. BRINKLEY /n AGARD Impact Injury Caused by Linear Acceleration: 14 p Oct. 1982 refs

Avail: NTIS HC A21/MF A01

Dynamic preload is anticipatory acceleration in the same direction as a later impact acceleration. To evaluate the influence of dynamic preload on human impact response, tests with volunteer subjects were conducted. Test data are presented which indicate that the peak forces and body segment accelerations imposed on subjects during impact accelerations are decreased when those impacts are preceded by dynamic preload. The impact response differences were more striking for comparisons between zero and low levels of dynamic preload than for comparisons between low and higher levels of preload. The threshold for these protective effects is apparently below 0.25 G dynamic preload for the test conditions investigated. In addition, the medical and subjective data support the assertion that dynamic preload is protective when applied prior to G(sub x) impact accelerations. Since impacts conducted on decelerator facilities are all influenced by track friction and therefore preceded by dynamic preload, it appears that they are fundamentally different from impacts conducted on accelerator facilities, involving zero dynamic preload. This indicates a need to reassess previous tolerance estimates derived from rocket sled decelerations. Decelerator tests do not appear to predict the more severe results of similar exposures on accelerators. Research efforts are continuing to further delineate the significance and utility of dynamic preload as a technique in impact injury prevention.

R.J.F.

N83-19448# Birmingham Univ. (England). Accident Research Unit.

HEAT PROTECTION FOR ROAD USERS WITH PARTICULAR REFERENCE TO HELMETS FOR MOTORCYCLISTS

J. B. PEDDER, S. B. HAGUES, and G. M. MACKAY /n AGARD Impact Injury Caused by Linear Acceleration: 14 p Oct. 1982 refs

Avail: NTIS HC A21/MF A01

The overall problem of head injuries resulting from road traffic accidents is discussed. The mechanism of head injuries and the development of human tolerance criteria is briefly discussed. An accident sample of fatally and seriously injured two-wheeled motor vehicle riders is examined. Data on the performance of the riders' helmets and the nature of the riders' head injuries are presented. This information is used to assess the protective value of current designs worn by the casualties. A comparison of the two groups of riders highlights the outstanding severity of head injuries sustained by the fatalities. In light of this field data, comments are made on the relevance of existing specifications for protective helmets.

R.J.F.

N83-19449# Institute of Aviation Medicine, Farnborough (England).

THE DEVELOPMENT AND INITIAL EVALUATION OF AN OBLIQUE-IMPACT TEST FOR PROTECTIVE HELMETS

D. H. GLAISTER /n AGARD Impact Injury Caused by Linear Acceleration: 8 p Oct. 1982 refs

Avail: NTIS HC A21/MF A01

The development of a novel test device in which angular forces are measured (or derived) following off axis impacts to a helmeted headform is discussed. The ultimate aim is to replace construction requirements by a definitive test. Prototype and second generation rigs are described and evaluated in tests on several types of helmets using a range of impact surfaces. Preliminary tests suggest that the method can differentiate between various shell materials.

With a modified anvil, surface irregularities can also be examined. Information can be made available relating to the instantaneous levels of friction developed during impacts, on the torque produced, and on the angular acceleration and terminal angular velocity achieved by the helmeted headform. The technique should provide a useful tool for the investigation and further development of protective helmets. R.J.F.

N83-19451# Wright State Univ., Dayton, Ohio.

BACKFACE SIGNATURE FROM BODY ARMOR

R. F. ROLSTEN and D. J. KARL /n AGARD Impact Injury Caused by Linear Acceleration: 10 p Oct. 1982 refs

Avail: NTIS HC A21/MF A01

Two types of body armor of light weight were developed that will prevent perforation. The textile armor will defeat the bullet fired from most handguns. The hard armor will defeat the calibre .30AP. A correlation was made between the laboratory and field evaluation results as they relate to backfire surface signature and blunt trauma sustained by the wearer. There is concern that a threat greater than calibre .30AP may provide a prohibitive level of impact energy and subsequent blunt trauma injury. The experimental and clinical techniques established for the flexible body armor may be useful as fiducial points in further development. R.J.F.

N83-19452# International Clinical Labs., Inc., Atlanta, Ga.

COST EFFECTIVENESS OF BODY ARMOR

R. H. HOLMES /n AGARD Impact Injury Caused by Linear Acceleration: 5 p Oct. 1982

Avail: NTIS HC A21/MF A01

Body armor is a common denominator of cost effectiveness. It is the only means we have for further reduction in battlefield mortality and morbidity. Protective devices for material and personnel must be continually upgraded. Present day helmet and body armor should provide significant reduction in killed in action and wounded in action. This reduction in casualties can be translated into savings of billions of dollars. A price cannot be placed on human life, but costs can be projected for lost lives and disabilities incurred. The aftermath of war related expenditures has become so great that societal pressures now challenge the rationale of payment. Protective armor is not just a wise investment, it is a necessity. R.J.F.

N83-19470*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

AN APPROACH TOWARD FUNCTION ALLOCATION BETWEEN HUMANS AND MACHINES IN SPACE STATION ACTIVITIES

G. VONTIESENHAUSEN Nov. 1982 41 p refs (NASA-TM-82510; NAS 1.15:82510) Avail: NTIS HC A03/MF A01 CSCL 05H

Basic guidelines and data to assist in the allocation of functions between humans and automated systems in a manned permanent space station are provided. Human capabilities and limitations are described. Criteria and guidelines for various levels of automation and human participation are described. A collection of human factors data is included. Author

N83-19471*# Massachusetts Inst. of Tech., Cambridge. Div. of Health Sciences and Technology.

CDTI: CREW FUNCTION ASSESSMENT Final Report, Jun. 1979 - Dec. 1982

J. R. TOLE and L. R. YOUNG 31 Dec. 1982 48 p refs

(Contract NCC1-23)

(NASA-CR-169917; NAS 1.26:169917) Avail: NTIS HC A03/MF A01 CSCL 05H

Man machine interaction often requires the operator to perform a stereotyped scan of instruments to monitor and/or control a system. Situations in which this type of behavior exists, such as instrument flight, scan pattern has been shown to be altered by imposition of simultaneous verbal tasks. The relationship between pilot visual scan of instruments and mental workload was described. A verbal loading task of varying difficulty caused pilots to stare at the primary instrument as the difficulty increased and to shed

looks at instruments of less importance. The verbal loading task affected rank ordering of scanning sequences. The behavior of pilots with widely varying skill levels suggested that these effects occur most strongly at lower skill levels and are less apparent at high skill levels. Graphical interpretation of the hypothetical relationship between skill, workload, and performance is introduced and modeling results are presented to support this interpretation.

B.G.

N83-19472*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering and Operations Research.

COMPARATIVE EVALUATION OF WORKLOAD ESTIMATION TECHNIQUES IN PILOTING TASKS Final Report, 1 Feb. 1980 - 1 Feb. 1983

W. W. WIERWILLE 1982 89 p refs

(Contract NAG2-17)

(NASA-CR-169979; NAS 1.26:169979; IEOR-DEPT-8303) Avail: NTIS HC A05/MF A01 CSCL 05H

Twenty workload estimation techniques were compared in terms of their sensitivity to changes in pilot loading in an ILS task. The techniques included opinion measures, spare mental capacity measures, physiological measures, eye behavior measures, and primary task measures. Loading was treated as an independent variable and had three levels: low, medium, and high. The load levels were obtained by a combined manipulation of windgust disturbance level and simulated aircraft pitch stability. Six instrumented-rate pilots flew a moving-base general aviation simulator in four sessions lasting approximately three hours each. Measures were taken between the outer and middle markers. Two opinion measures, one spare mental capacity measure, one physiological measure, and one primary task measure demonstrated sensitivity to loading in this experiment. These measures were Cooper-Harper ratings, WCI/TE ratings, time estimation standard deviation, pulse rate mean, and control movements per unit time. The Cooper-Harper ratings, WCI/TE ratings, and control movements demonstrated sensitivity to all levels of load, whereas the time estimation measure and pulse rate mean showed sensitivity to some load levels.

Author

N83-19473*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering and Operations Research.

COMPARATIVE EVALUATION OF WORKLOAD ESTIMATION TECHNIQUES IN PILOTING TASKS Final Report, 1 Feb. 1980 - 1 Feb. 1983

W. W. WIERWILLE 1983 89 p refs

(Contract NAG2-17)

(NASA-CR-169981; NAS 1.26:169981; IEOR-8303) Avail: NTIS HC A05/MF A01 CSCL 05H

Techniques to measure operator workload in a wide range of situations and tasks were examined. The sensitivity and intrusion of a wide variety of workload assessment techniques in simulated piloting tasks were investigated. Four different piloting tasks, psychomotor, perceptual, mediational, and communication aspects of piloting behavior were selected. Techniques to determine relative sensitivity and intrusion were applied. Sensitivity is the relative ability of a workload estimation technique to discriminate statistically significant differences in operator loading. High sensitivity requires discriminable changes in score means as a function of load level and low variation of the scores about the means. Intrusion is an undesirable change in the task for which workload is measured, resulting from the introduction of the workload estimation technique or apparatus.

E.A.K.

N83-19474*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

VISUAL SCANNING BEHAVIOR AND PILOT WORKLOAD

R. L. HARRIS, SR., J. R. TOLE, A. T. STEPHENS, and A. R. EPHRATH 1981 9 p Presented at the Symp. on Aviation Psychology, Columbus, Ohio, 22-23 Apr. 1981 Prepared in cooperation with MIT, Cambridge

(NASA-TM-85219; NAS 1.15:85219) Avail: NTIS HC A02/MF A01 CSCL 05H

An experimental paradigm and a set of results which demonstrate a relationship between the level of performance on a skilled man-machine control task, the skill of the operator, the level of mental difficulty induced by an additional task imposed on the basic control task, and visual scanning performance. During a constant, simulated piloting task, visual scanning of instruments was found to vary as a function of the level of difficulty of a verbal mental loading task. The average dwell time of each fixation on the pilot's primary instrument increased as a function of the estimated skill level of the pilots, with novices being affected by the loading task much more than the experts. The results suggest that visual scanning of instruments in a controlled task may be an indicator of both workload and skill.

Author

N83-19475*# Massachusetts Inst. of Tech., Cambridge. Biomedical Engineering Center for Clinical Instrumentation.

INSTRUMENT SCAN: IS IT AN INDICATOR OF THE PILOT'S WORKLOAD?

A. R. EPHRATH, J. R. TOLE, A. T. STEPHENS, and L. R. YOUNG 1983 3 p refs Previously announced in AIAA as A82-22924

(Contract NCC1-23)

(NASA-CR-169944; NAS 1.26:169944) Avail: NTIS HC A02/MF A01 CSCL 05H

For abstract, see A82-22924.

N83-19476*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ENTROPY, INSTRUMENT SCAN AND PILOT WORKLOAD

J. R. TOLE (Worcester Polytechnic Inst.), A. T. STEPHENS (Boeing Co., Renton, Wash.), M. VIVAUDOU (Worcester Polytechnic Inst.), R. L. HARRIS, JR. (Bell Labs., Piscataway, N.J.), and A. R. EPHRATH 1982 8 p refs Presented at IEEE conf. on Systems, Man and Cybernetics, Seattle, Oct. 1982

(Contract NCC1-23; NCC1-56)

(NASA-TM-85145; NAS 1.26:85145) Avail: NTIS HC A02/MF A01 CSCL 05H

Correlation and information theory which analyze the relationships between mental loading and visual scanpath of aircraft pilots are described. The relationship between skill, performance, mental workload, and visual scanning behavior are investigated. The experimental method required pilots to maintain a general aviation flight simulator on a straight and level, constant sensitivity, Instrument Landing System (ILS) course with a low level of turbulence. An additional periodic verbal task whose difficulty increased with frequency was used to increment the subject's mental workload. The subject's looppoint on the instrument panel during each ten minute run was computed via a TV oculometer and stored. Several pilots ranging in skill from novices to test pilots took part in the experiment. Analysis of the periodicity of the subject's instrument scan was accomplished by means of correlation techniques. For skilled pilots, the autocorrelation of instrument/dwell times sequences showed the same periodicity as the verbal task. The ability to multiplex simultaneous tasks increases with skill. Thus autocorrelation provides a way of evaluating the operator's skill level.

S.L.

N83-19477*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

HUMAN FACTORS ASPECTS OF CONTROL ROOM DESIGN: GUIDELINES AND ANNOTATED BIBLIOGRAPHY

C. M. MITCHELL, L. J. STEWART, A. K. BOCAST, and E. D. MURPHY Dec. 1982 357 p refs Prepared in cooperation with George Mason Univ.

(Contract NAS5-26952)

(NASA-TM-84942; NAS 1.15:84942) Avail: NTIS HC A16/MF A01 CSCL 05H

A human factors analysis of the workstation design for the Earth Radiation Budget Satellite mission operation room is discussed. The relevance of anthropometry, design rules, environmental design goals, and the social-psychological environment are discussed. R.J.F.

N83-19478*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

HUMAN FACTORS ANALYSIS OF WORKSTATION DESIGN: EARTH RADIATION BUDGET SATELLITE MISSION OPERATIONS ROOM

L. J. STEWART, E. D. MURPHY, and C. M. MITCHELL Dec. 1982 85 p refs Prepared in cooperation with George Mason Univ.

(Contract NAS5-26952)

(NASA-TM-84943; NAS 1.15:84943) Avail: NTIS HC A05/MF A01 CSCL 05H

A human factors analysis addressed three related yet distinct issues within the area of workstation design for the Earth Radiation Budget Satellite (ERBS) mission operation room (MOR). The first issue, physical layout of the MOR, received the most intensive effort. It involved the positioning of clusters of equipment within the physical dimensions of the ERBS MOR. The second issue for analysis was comprised of several environmental concerns, such as lighting, furniture, and heating and ventilation systems. The third issue was component arrangement, involving the physical arrangement of individual components within clusters of consoles, e.g., a communications panel. R.J.F.

N83-19479# MATRA Service Aerodynamique, Velizy-Villacoublay (France).

STUDY AND REALIZATION OF AN ELECTRONIC INTERFACE FOR AN ASSEMBLY ROBOT [ETUDE ET REALISATION D'ELECTRONIQUE D'INTERFACE AU SEIN D'UNE ROBOTIQUE D'ASSEMBLAGE]

N. GEISLER and B. ROGER 1982 60 p In FRENCH (RS-0484.DX.60) Avail: NTIS HC A04/MF A01

The Puma 500 robot simulates a right hand by accomplishing a precise trajectory. An interface is needed to effect liaison between the real time peripheric module of the computer which outputs numerical data under the form of 16-bit words and lines permitting dialog with the exterior. Command words for displacement are coded at 16-bit words, while commands for the speed of displacement are coded on 8 bits. The interface must then generate a series of impulses whose number and frequency are fixed by the two command words. Since the motor cannot respond to a speed scale, the interface is needed to generate rates of acceleration and deceleration. Multiplexing, sequencing, synchronizing, timing, and signals for resetting are discussed. Chronographs of the principal signals are presented.

Transl. by A.R.H.

N83-19480# Army Aeromedical Research Lab., Fort Rucker, Ala. Visual Sciences Research Group.

MODIFIED FACEPLATE FOR AN/PVS-5 NIGHT VISION GOGGLES Final Report

W. E. MCLEAN Oct. 1982 64 p

(Contract DA PROJ. 3E1-62777-A-879)

(AD-A121151; USAARL-83-1) Avail: NTIS HC A04/MF A01 CSCL 06Q

Lack of peripheral vision while flying with the AN/PVS-5 night vision goggles (NVG) was a contributing factor in an aircraft accident. Because of this accident, a modified faceplate (MFP)

for NVG was configured to allow pilots unaided lateral and lower vision. Twenty MFP NVG were worn during flight by 47 NVG qualified aviators for an average of 18 hours per aviator. The average recorded flight hours for each of the 20 MFP NVG was 43.5 hours. NVG aviators indicated that the MFP significantly enhanced intruder aircraft detection, inside-the-cockpit vision, and comfort. Spectacles can be worn with the MFP, and less fogging of the eyepieces occur. There were deficiencies reported during the study which were corrected with modifications to the mounting apparatus, thorough preflight briefings, and required familiarization flights. The proposed modification is being considered for adoption by the proper authorities. Author (GRA)

N83-19481# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.

POSITION AND VELOCITY MEASUREMENT BY OPTICAL SHAFT ENCODERS Interim Report

K. V. RANGAN 23 Jun. 1982 31 p refs

(Contract N00014-81-K-0503)

(AD-A121385; CMU-RI-TR-82-8) Avail: NTIS HC A03/MF A01 CSCL 05H

Accurate measurement of the angular position and angular velocity of the joints is essential in the control of a robot manipulator. This report analyses in detail the design and implementation of a measurement system for the CMU Direct Drive Arm using High resolution Optical Shaft Encoders. Two methods of angular velocity measurement, velocity by change of position and velocity by frequency, are analyzed and compared.

Author (GRA)

N83-19482# New York Univ., New York. Center for Safety. **THE BIOMECHANICS OF LIFTING AND MATERIALS HANDLING Final Report**

E. R. TICHAUER, S. ELBAUM, F. GLICKMAN, C. GOLD, and C. TAUBER 1981 179 p refs Sponsored in part by the National Inst. for Occupational Safety and Health

(PB82-230996; HSM-99-72-13) Avail: NTIS HC A09/MF A01 CSCL 06J

Musculoskeletal responses elicited by static lifting were investigated. Kinesimeters were constructed capable of measuring postural changes during standing and seated tasks and which automatically computed cartesian coordinates of anatomical landmarks of individual engaged in a lifting task. The authors conclude that the isometric elements of a lifting task are more hazardous than other components. They recommend that electromyographic and biomechanical data, gathered from a male population, not be extrapolated to a female working population as the responses of both sexes to static lifting stress are quite different.

Author (GRA)

N83-19783*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Control Center.

THE MEASUREMENT OF OPERATOR WORKLOAD IN THE MARK IVA DSCC MONITOR AND CONTROL SUBSYSTEM

M. LEMAY (Monclair State Coll.), R. L. CHAFIN, and E. E. HIRD In its The Telecommun. and Data Acquisition Rept. p 177-185 15 Feb. 1983 refs

Avail: NTIS HC A11/MF A01 CSCL 05H

An operator workload measurement methodology is presented which will be used in support of the Mark IVA operational test and evaluation plan. Three operator workload measures are suggested: operator ratings, primary task work measures, and information processing time measures. A method of validating the workload measures using secondary task work measures is presented. It is expected that operations testing using these measures will assist in establishing the time required to perform essential operational activities and will indicate high risk operations areas due to potential operator overload. S.L.

N83-20274# Societe d'Etudes et Conseils Aero, Paris (France). **HUMAN FACTORS ASPECT AS AN EXTENSION OF QUALITY ASPECTS [LE PLAN FACTEURS HUMAINS COMME EXTENSION DE PLAN DE QUALITE]**
J. MARGUIN /n ESA Reliability and Maintainability p 685-692
Sep. 1982 refs In FRENCH
Avail: NTIS HC A99/MF A01

Man machine relations at the level of system design and development can be optimized using a human factors plan which is proportionally related to the quality plan. The necessity of considering human factors (operator performance, human reliability) in the design phases is discussed and the typical unfolding of a human factors plan is during program phases is described as well as its organization and the methods it implies. The methods of analysis applicable in this domain, the sources of data, and the mathematical models available are considered. Transl. by A.R.H.

N83-20564*# Houston Univ., Clear Lake, Tex. **ANALYSIS OF PHYSICAL EXERCISES AND EXERCISE PROTOCOLS FOR SPACE TRANSPORTATION SYSTEM OPERATION Final Report, 1 Sep. 1980 - 31 Dec. 1982**
A. E. COLEMAN 31 Dec. 1982 51 p refs
(Contract NAS9-16136)
(NASA-CR-167807; NAS 1.26:167807) Avail: NTIS HC A04/MF A01 CSCL 06P

A quantitative evaluation of the Thornton-Whitmore treadmill was made so that informed management decisions regarding the role of this treadmill in operational flight crew exercise programs could be made. Specific tasks to be completed were: The Thornton-Whitmore passive treadmill as an exercise device at one-g was evaluated. Hardware, harness and restraint systems for use with the Thornton-Whitmore treadmill in the laboratory and in Shuttle flights were established. The quantitative and qualitative performance of human subjects on the Thornton-Whitmore treadmill with forces in excess of one-g, was evaluated. The performance of human subjects on the Thornton-Whitmore treadmill in weightlessness (onboard Shuttle flights) was also determined.

S.L.

N83-20565# Virginia Polytechnic Inst. and State Univ., Blacksburg. **EFFECTS OF SYSTEM-TIMING PARAMETERS ON OPERATOR PERFORMANCE IN A PERSONNEL RECORDS TASK Final Report, 15 Jul. 1979 - 31 Mar. 1981**
R. C. WILLIGES and B. H. WILLIGES Nov. 1982 65 p refs
(Contract N00123-80-C-0300)
(AD-A121893; NPRDC-TN-83-1; VPI-17-82-5) Avail: NTIS HC A04/MF A01 CSCL 05H

Meaningful human factors applications to the design of human/computer tasks require a quantitative data base that describes operator behavior as a function of various independent variables. Three classes of metrics, operator satisfaction ratings, work sampling procedures, and embedded performance measurement, are described as important measures in evaluating human/computer interfaces. Polynomial regression procedures were used to generate functional relationships between each of these classes of metrics and four independent variables representing timing attributes of an interactive computer system used to enter and update personnel records (system delay, display rate, keyboard echo rate, and rollover buffer length of the keyboard). Each of the 22 dependent variables in the three classes of metrics showed different functional relationships among the four system variables, but overall system delay and keyboard echo rate were the major predictors of operator behavior. Additionally, the three classes of metrics were combined into three underlying interface dimensions relating to operator production, waiting, and planning activities. Author

N83-20566# Electronic Data Systems Corp., Panama City, Fla. **IMPROVED SELF-CONTAINED BREATHING APPARATUS CONCEPT Final Report, Oct. 1980 - Jun. 1982**
L. WHITE and J. WALKER Tyndall AFB, Fla. AFESC Aug. 1982 201 p
(Contract F08635-80-C-0297; AF PROJ. 2505)
(AD-A120944; AFESC/ESL-TR-82-24) Avail: NTIS HC A10/MF A01 CSCL 06K

Past operational experiences of USAF fire fighting and rescue teams have indicated the need for an improved self-contained breathing apparatus (SCBA). In October 1980, a contract was awarded to Electronic Data Systems, Panama City, Florida, to design and develop a prototype SCBA that would meet Air Force technical requirements. A prototype was designed, developed, and tested through a subcontract with Reimers Consultants, Falls Church, Virginia. This report describes the technical requirements, a detailed technical description of the unit, and the unmanned test procedures and results. The unmanned testing demonstrate that the prototype SCBA meets all performance requirements, except for weight. The fully charged prototype weights 34 pounds, the maximum acceptable weight is 30 pounds. With the other performance requirements either met or exceeded, manned testing of the SCBA can proceed. Author (GRA)

N83-20567# Cornell Univ., Ithaca, N. Y. Dept. of Computer Science. **DETERMINING POINTS OF A CIRCULAR REGION REACHABLE BY JOINTS OF A ROBOT ARM**
J. E. HOPCROFT, D. A. JOSEPH, and S. H. WHITESIDES Oct. 1982 44 p refs
(Contract N00014-76-C-0018; NSF MCS-81-01220)
(AD-A121992; CU-CSD-TR-82-516) Avail: NTIS HC A03/MF A01 CSCL 12A

An arm is a sequence of links whose endpoints are connected consecutively by movable joints. The location of the first endpoint is fixed. This report gives a polynomial time algorithm for determining the regions that each joint can reach when the arm is restricted to a circular region of the plane. Author (GRA)

N83-20568# Navy Personnel Research and Development Center, San Diego, Calif. **ACCURACY, TIMELINESS, AND USABILITY OF EXPERIMENTAL SOURCE DATA MODULES Final Report, 1980 - 1981**
J. S. MALONE, R. W. OBERMAYER, E. R. N. ROBINSON, and K. H. FUNK (Oregon State Univ.) Nov. 1982 45 p refs
(AD-A121788; NPRDC-TR-83-1) Avail: NTIS HC A03/MF A01 CSCL 05H

Three computer interface systems were developed and tested in a Navy Pay/Personnel Administrative Support System (PASS) office. These three systems were used to analyze personnel performance times, errors, and the effects of computer system parameters on error rates. This report describes the interface systems, discusses their advantages and limitations, and provides recommendations for the future development of a source data entry module for use in personnel office information systems. Author (GRA)

N83-20569# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario). **MMI CONSIDERATIONS IN THE TELETIDE GRAPHICS SYSTEM**
C. MCCANN Jun. 1982 21 p refs
(AD-A121753; DCIEM-TC-82-C-20) Avail: NTIS HC A02/MF A01 CSCL 05H

SHAPE Technical Center has developed the Transitional Information Distribution Experiment (TIDE) to study the storage, handling and display of information in SHAPE HQ. This report comments on some human factors aspects of the Teletide Graphics System (Version 2.0), the part of TIDE used to create, manipulate and display information on maps. Relevant portions of DCIEM research plans are briefly described. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

N83-20570# Army Aeromedical Research Lab., Fort Rucker, Ala. Biomedical Applications Research Div.

PERFORMANCE IMPACT OF CURRENT UNITED STATES AND UNITED KINGDOM AIRCREW CHEMICAL DEFENSE ENSEMBLES Final Report, 1 Jul. 1981 - 1 Jul. 1982

B. E. HAMILTON, D. FOLDS, and R. R. SIMMONS Sep. 1982
44 p refs

(AD-A121502; USAARL-82-9) Avail: NTIS HC A03/MF A01
CSCL 15B

The ability of helicopter pilots to fly while wearing chemical defense (CD) ensembles in hot weather was investigated. Each subject flew on three separate days, wearing a different ensemble each day. The ensembles tested were the United States Army Aircrew chemical defense ensemble, the United Kingdom aircrew chemical defense ensemble, and the United States Army standard flight suit uniform. While subjects made statistically larger heading errors while wearing the US chemical defense ensemble, no operationally significant differences in performance were seen. It is concluded that a pilot's performance is not an indicator of heat stress.

E.A.K.

N83-20571# Cornell Univ., Ithaca, N. Y. Dept. of Computer Science.

MOVEMENT PROBLEMS FOR 2-DIMENSIONAL LINKAGES

J. E. HOPCROFT, D. A. JOSEPH, and S. H. WHITESIDES Aug. 1982 30 p refs

(Contract N00014-76-C-0018)

(AD-A121954; TR-82-515) Avail: NTIS HC A03/MF A01 CSCL 06D

This paper is motivated by questions concerning the planning of motion in robotics. In particular, it is concerned with the motion of planar linkages from the complexity point of view. There are two main results. First, a planar linkage can be constrained to stay inside a bounded region whose boundary consists of straight lines by the addition of a polynomial number of new links. Second, the question of whether a planar linkage in some initial configurations can be moved so that a designated joint reaches a given point in the plane is PSPACE-hard.

Author (GRA)

N83-20572# National Academy of Sciences - National Research Council, Washington, D. C. Advisory Board on Military Personnel Supplies.

DEHYDRATION AND COMPRESSION OF FOODS Final Workshop Report

1982 49 p refs

(Contract DAAK60-79-C-0015)

(PB83-111682; ABMPS-116) Avail: NTIS HC A03/MF A01
CSCL 06H

This report contains an examination of the problems faced by the armed forces in attempting to obtain high quality, dehydrated compressed foods as economically as possible.

GRA

N83-20573# National Academy of Sciences - National Research Council, Arlington, Va. Committee on Animal Products.

RECONSTRUCTED MEAT TECHNOLOGY FOR THE MILITARY

1982 52 p refs

(Contract DAAK60-79-C-0015)

(PB83-11690; ABMPS-124) Avail: NTIS HC A04/MF A01
CSCL 06H

Areas of the technology of restructured meats of particular interest to the military such as equipment, processes, and products are discussed. Additives that influence the functional properties of restructured meats; storage stability; mechanically deboned and desinewed meats in restructured meats; and restructured marine products are also discussed.

GRA

N83-20694# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

DISPLAY-CONTROL COMPATIBILITY IN 3-D DISPLAYS

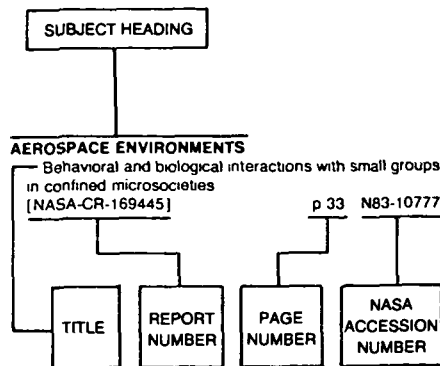
A. W. F. HUGGINS and D. J. GETTY *In* NAS-NRC
Three-Dimensional Displays p 29-54 1982 refs

Avail: NTIS HC A09/MF A01 CSCL 05H

Some problems of display-control compatibility that confront the human operator of a true volumetric 3-D are explored. The speed and accuracy with which an operator can make decisions about directions in displayed object-space (up, down, left, right), when an object is presented in unpredictable orientations is measured. Operators employ three strategies in this task. In order of decreasing speed and accuracy, they are: (1) a spatial strategy, which can be applied only when the display object and the control object are in the same orientation; (2) a relational strategy, in which the choice is made on the basis of the spatial relationship between the cued direction and the orientation cue provided in the icon; and (3) a rotational strategy, in which the operator mentally rotates his body position so as to make the orientation of the displayed object equivalent to that of the control object. In the third strategy, response times increase progressively with the amount of rotation required. In the final experiments, it is shown that use of the third strategy can be avoided by appropriate coding of the display icon.

Author

Typical Subject Index Listing



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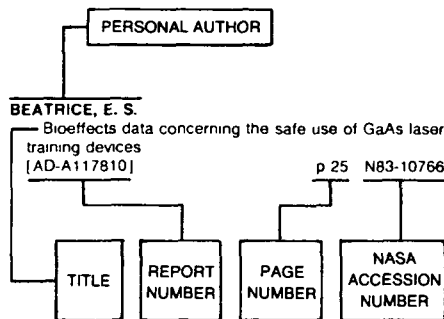
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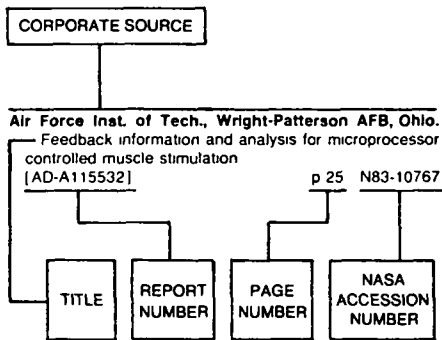
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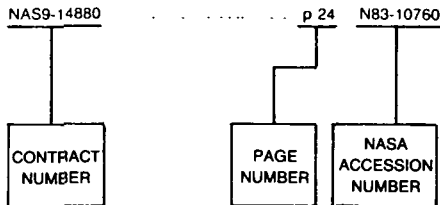
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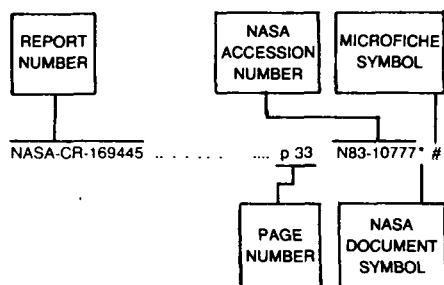
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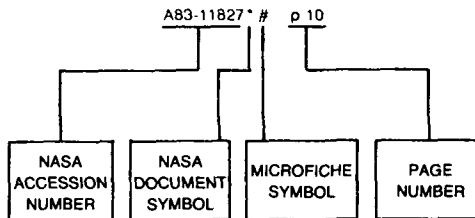
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ACCESSION

1. Report No. NASA SP-7011(246)	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography (Supplement 246)		5. Report Date June 1983	
		6. Performing Organization Code	
7. Author(s)		8. Performing Organization Report No.	
		10. Work Unit No.	
9. Performing Organization Name and Address National Aeronautics and Space Administration Washington, D.C. 20546		11. Contract or Grant No.	
		13. Type of Report and Period Covered	
12. Sponsoring Agency Name and Address		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract <p style="text-align: center;">This bibliography lists 219 reports, articles and other documents introduced into the NASA scientific and technical information system in May 1983.</p>			
17. Key Words (Suggested by Author(s)) Aerospace Medicine Bibliographies Biological Effects		18. Distribution Statement Unclassified - Unlimited	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 78	22. Price* \$7.00 HC

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